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Use of a Database Feature in the TrueAllele®Casework System to Cross Compare DNA Cases

Dr. Nasir Butt, Ph.D.* and Jeffrey Oblock, B.S.,



The History

- Spike in auto thefts in multiple westside suburbs of Cleveland, Ohio in the summer and fall of 2015
- Believed to be committed by the same gang of juveniles
- Most vehicles stolen over night from driveways
 or from the street
- Vehicles were unlocked or windows smashed
- Steering columns "peeled" or keys left inside vehicle



The Numbers

- 37 separate incidents/cases submitted for testing
- 6 different jurisdictions
- 161 total evidence samples
 - Swabs from various areas of recovered autos
 - Personal property left behind
- 38 suspect reference samples collected
 - during gang "round up" (72 total references) THESE ALE BUCHL SWARS CLUDGED FROM SUSPECTS RELAND to THE METROPARKS KLODDER (15-50-51) AND POLARD WEST SIDE CRIME (FUNG) (GADG WUEST.



The Challenge

- Efficiently cross-compare 38 suspect references to each of the 37 cases/100+ evidence samples
 - Manual interpretation done using in-house protocols with RMP/CPI
 - Many man hours of desk work
 - Ignoring profiles/data
 - Probabilistic Genotyping using TrueAllele[®] Technology's Databasing Feature done by Cybergenetics



Manual Interpretation

- Threshold 200RFU cutoff
- Profiles reported as single source and major/minor or indistinguishable mixtures up to 3 contributors
- >3 is inconclusive due to too many contributors
 Statistical calculations
 - RMP for single source and major profiles
 - CPI for indistinguishable mixtures
- General rules
 - >50% data (alleles) needed for inclusions
 - <50% data inconclusive due to insufficient information

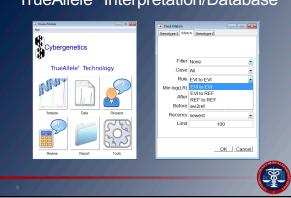


Manual Interpretation

- ~2 months from initial testing to release of 37 reports
- ~1 additional month for release of 26 supplemental reports for additional suspect submissions
- 11 of the 38 suspects were associated to at least one case (RMP/CPI)
- 4 of the 11 positively associated suspects were connected to more than one case
- 30 evidence samples contained no or insufficient amount of DNA
- 30 profiles were reported as inconclusive due to too many contributors or insufficient information (some minor components also)



- Cuyahoga County Prosecutor's Office made aware of TA Databasing capabilities
- .hid data files sent to Cybergenetics for TA analysis
- All profiles run through TA including those manually deemed inconclusive
 Low data/3+ contributors
- Database Match Rules: *EVI-EVI, EVI-REF, REF-REF*



TrueAllele® Interpretation/Database

				ıle				
		511						
295	2 2015-4319-3_rcce3_5K	EVI	25,994	24.559	250	1 2015-4319-1 1_BOOK3_5K	EM	28.018
111	1 2015-5553-7_rcce3_5K					3 2015-5553 7_rcce3_5K		26.091 29,799
		EW	25.430	24,358	315		EVA	28,599
296	1 2015-4319-6 rece3 5K	EM	22.514	24.004	296	2/2015-4319-4 receil 5K	654	26.914
315			20.660	24,289	315			29,799
314	32015-4421-2_00063_5K		25.430	24,258		22015-4421-6_00063_5K	214	27.006
	3 2015-3000-5 rcce3_5K	EM	23.160				EM	23/627
359	1 2015-4623-9.1 acond_5K	EM	22,022	24.075	363	2 2015-4623-10.1_scox3_5K	654	34.882
317	3 2015-4421-5_rcce3_5K	EVI	25.112	24.054	318	22015-4421-6_ncce3_5K	EM	27.005
								23.004
	32015-4419.9 pros3 5K					12015-4410.0 pres3_5K		27.509
314	32015-4421-2 rcce3 5K	EV	25.430	23.574	200	22015-4421-0 RP root3 5K	EM	27.509
319	1 2015-4422-1 2 moon3 .5K	EM	23.594	23.561	326	1 2015-4516-18.2 month 5K	654	29,211
								29,799
								25.112 28.051
300	12015-4309-11_R0013_5K	EV	24,855	23.144	300	22015-4513-6_R083_5K	EM	28.430
115	3 2015-3005-4, rece3, 5K	EW	24.436	23.105	114	2 2015-3505-3, rece3, 5K	654	26,239
346				23.043	340			22.040
								30.000
343	12015-4500-1 rece3 5K	EM	20.944	22.558	243	22015-4500-1 rcce3 5K	EM	22,711
347	3 2015-4507-11_ncon3_5K	EVE	18.666	22.519	155	32015-4513-0_ncee3_5K	EM	27.274
121	2 2015-3006-6_rcce3_5K	EM	20.534	22.504	173	2 2015-3006-6_RI_rcce3_5K	EM.	23.301
								32,902
								27,216
310	2 2015-4421-4_rcce3_5K	EM	22.260	22.604	300	2 2015-4421-6_RP_rcon3_5K	EM	27.509
319	12015-4422-12_scor0_5K	EV	23.594	22.370	342	3 2015-4520-0_00003_5K	EM	32.495
								21.355 23.039
								27.005 -
	285 285 288 288 288 314 315 316 315 316 315 317 317 317 317 317 317 317 317						Bit Distribution Distribut	Bit Dist Dist <thdist< th=""> Dist Dist D</thdist<>

 TrueAllele® Interpretation/Database

 • EVI-REF Match Rule

teles.	141	comb1 32015.4329.4 mon3 5K	EM.	10 500	16.026	HODE 2	12015.4071.19 of	REF.	2473	
	123	12015-3981-10 mon3 5K	614	12 367	15.404	24	12015-4071-22 rdf	REF	33.610	
10	105	120154513.6 00003.5K	EM	09.273	15,299	62	12015-4507-4 00	REF	33.030	
8	152	12015-4513-3 mon3 5K	EM	10.504	15,253	63	12015-4507-5 ref	REF	25.194	
	341	3 2015-4520-5.1 mon3 5K	EV1	14,709	15,211	90	12015-4071-5 ref	107.7	31,202	
10	163	3201545134 mon3 5K	EM	14,302	15.059	61	12015-4507-3 ref	REF	22.021	
	255	1.2015-4623-4 mon3 5K	EV1	09.637	15,050	100	12015-4523-11 ref	REF	31.767	
	313	32015.4516.6 pcord 5K	EM	12 204	14.550	04	12015.4510.1 (ef	REE	20.400	
10	119	3/2015-3906-4 mon0 5K	EM	13,306	14.551	47	12015-3905-11 ref	REF	30.723	
10	134	12015/2081.4 00003 58	201	16 198	14.182	55	12015.3981.12 of	MARK .	34 203	
15	341	2 2015 4520 5 1 mon3 5K	EM	15,000	14.067	90	12015-4071-0 ref	REF	21,209	
	354	3/2015-4623-3 mon3 5K	EV1	16.747	14.056	63	12015-4071-16 ref	REF	35.759	
- 10	331	12015.4516.4 ncon0.5K	EM	11.109	13 972	0.5	12015-4510.1 ref	REF	20.400	
	350	2 2015-4019-3 mon3 5K	EV1	18.015	13.947	100	12015-4519-1 ref	REF	28.177	
10	312		EM	11,298	13,621	61	12015.4507.3 of	REF	33 031	
10	131	2,2015-3910-3 mon3 5K	EM	12,741	13,701	53	12015-3910-4 ref	REF	30.107	
	101	1 2015-4513-5 P8 room3 5K	EV4	19.870	13,686	62	12015-4507-4 ref	NET	33.030	
0	338	320154529.2.1.1 mm2 5K	EM	09 655	13 437	64	12015-4515-5 ref	REF	34,593	
	359	32015-4623-9.1 mon3 5K	EV1	14,005	13,376	15	12015-4071-18 ref	DPT.	33.679	
0	142	2 2015 4507.9 mond 5K	EM	25.500	13 254	61	12015.4507.3 04	REF	33 631	
	254	2.2015-4623-3 mon3 5K	EV4	13.941	13,204	10	12015-4071-16 ref	REF	35.759	
13	101	2 2015-4513-2 ncon3.5K	EM	21.825	13.248	63	12015-4507-5_ref	REF	35.194	
15	338	12015-4520-2.1.1 mon0.5K	EM	07.073	13 147	64	12015-4515-5 ref	REF	34 593	
	102	1 2015-4518-1 mon3 5K	EVI	12,059	13,025	85	12015-4071-18 ref	NET	33.879	
10	134	32015-2981-4 ncon3 5K	EM	13,205	12,999	55	12015-3981-12 of	REF	34,208	
11	307	12015-4419-7 mon0 5K	EM	11.415	12 902	64	12015-4515-5 ref	REF	24 593	
	307	12014-4419-7 887 (2003) 58	514	18,234	12.620	64	12015-4515-5 ref	MPT.	34 503	
0	341	2 2015 4520.5 1_scos3_5K	EM	15 000	12,756	64	12015-4515-5 mf	REF	34 593	
	345	22015-4011-3 mon3 5K	EV1	13.644	12,700	04	12015-4071-17 ref	REF	28 372	
10	342	120154520.6 0000 5K	EM	08 104	12,561	64	12015-4515-5 00	REF	34,593	
1	147	12015-4507-11 mon0 5K	EM	00.405	12:001	62	12015-4507-4 ref	REF	33,000	
10	122	22015/2006/2 00003 5K	200	03 942	12.127	50	12010-3006-1 of	NET	28.352	
10	357	1 2015 4623 7_ncm2_5K	EM	12,609	11 979	102	12015-4020-1 ref	REF	29.409	
	129	1 2015-3909-3 mon3 5K	EV1		11.924	52	12015-3909-4 ref	REF	32.193	

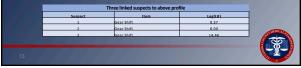
TrueAllele® Interpretation/Database

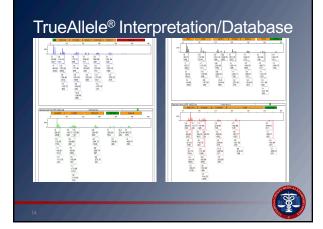
- EVI-REF Match Rule
- Link suspects to multiple cases
- Avoid direct comparison between reference and evidence profiles

Case	Item		
Case		Log(LR)	
1	Steering Wheel	12.45	
2	Steering Wheel	6.44	
3	Steering Wheel	2.28	
4	Flashlight	4.02	
	Steering Wheel	16.04	
	Steering Wheel	5.21	
5	Cigar	6.36	
	Steering Wheel	9.54	
6	Ignition Key	2.33	
	Gear Shift	5.99	
7	Gear Shift	4.22	
	Driver Door Handle	3.00	
	Pass, Door Handle	4.55	
8	Cigar	13.52	
	Cigarette Butt	14.84	
	Ziploc Package	10.32	
		G	

TrueAllele® Interpretation/Database

- EVI-REF Match Rule
- Profiles not considered previously provide match information
- Manually interpreted profile was inconclusive due to >3 contributors
- Three linked suspects identified in the TA database





The Summary

Manual

- ~2 month from testing to report
 ~1 month from data release, additional month to release supplemental reports
- 11 of 38 suspects associated to at least one case

TrueAllele

- upload/request to preliminary
- 16 of 38 suspects associated to at least one case
- 4 of the 11 suspects connected to multiple cases
 30 profiles reported as inconclusive
 12 samples reported as exclusions
 8 of the 16 suspects connected to multiple cases
 8 of the 16 suspects connected to multiple cases
 8 of the 16 suspects connected to multiple cases
 9 Optime case
 9 Optime case<

Acknowledgements

Work would not be possible without the efforts and support of member of the Cybergenetics team:

Bill P. Allen, MS Jennifer M. Hornyak, MS Dr. Mark W. Perlin, PhD, MD, PhD Matthew Legler



Thank You!

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