

Identifying Victim Remains Using Kinship Genotype Inference

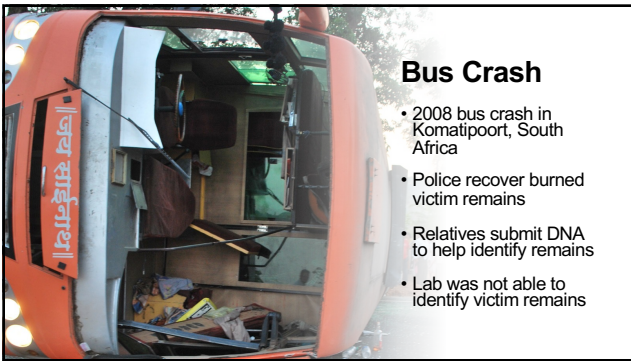
American Academy of Forensic Sciences
Criminalistics Section

February 2023
Orlando, FL

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Bus Crash

- 2008 bus crash in Komatipoort, South Africa
- Police recover burned victim remains
- Relatives submit DNA to help identify remains
- Lab was not able to identify victim remains

Victim Remains

Victim Remains

- AO0553E
- AO0554E
- AO0555E
- AO0556E
- AO0557E
- AO0558E
- AO0559E
- AO0560E
- AO0561E
- AO0562E
- AO0563E
- AO0564E
- AO0565E
- AO0566E
- AO0567E

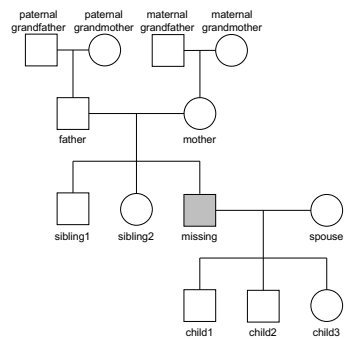
Relatives of Missing People

Sample	Relation
AP2438C	Grandfather
AP2439C	Daughter
AP2440C	Son
AP2441C	Mother
AP2442C	Son
AP2443C	Sister
AP2444C	Father
AP2445C	Son
AP2446C	Unknown
AP2447C	Brother
AP2448C	Brother
AP2449C	Sister
AP2450C	Mother
AP2451C	Son
AP2452C	Father
AP2455C	Son

Task: Find DNA Matches

Victim Remains	Sample	Relation
AO0553E	AP2438C	Grandfather
AO0554E	AP2439C	Daughter
AO0555E	AP2440C	Son
AO0556E	AP2441C	Mother
AO0557E	AP2442C	Son
AO0558E	AP2443C	Sister
AO0559E	AP2444C	Father
AO0560E	AP2445C	Son
AO0561E	AP2446C	Unknown
AO0562E	AP2447C	Brother
AO0563E	AP2448C	Brother
AO0564E	AP2449C	Sister
AO0565E	AP2450C	Mother
AO0566E	AP2451C	Son
AO0567E	AP2452C	Father
	AP2455C	Son

Kinship Relations



Crime Lab – No Results

	11	12
10		
11		11 12

Crime Lab – No Results

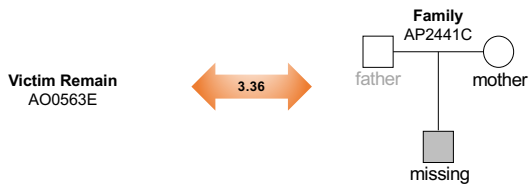
	11	12
10		
11		11 12

	?	?
?		
?		11 12

The TrueAllele Approach

- Computer automation:
- Reference genotypes
 - Kinship genotypes
 - Comparison
 - Match Statistics

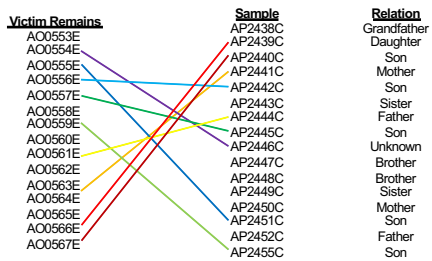
Genotype Matching



Identification Results

Victim remains	Relations of missing persons							
	AP2439C	AP2440C	AP2441C	AP2442C	AP2443C	AP2444C	AP2445C	AP2446C
AO0553E							4.45	
AO0554E								1.88
AO0555E			5.03					
AO0556E					3.57			
AO0557E								
AO0558E								2.95
AO0559E								
AO0560E					2.34			
AO0561E								
AO0562E			3.36					
AO0563E								
AO0564E								
AO0565E								
AO0566E	4.03							
AO0567E		2.25						

Matches TrueAllele Found



Matches TrueAllele Found

Victim Remains	Sample	Relation
AO0553E	AP2439C	Grandfather
AO0554E	AP2439C	Daughter
AO0555E	AP2440C	Son
AO0556E	AP2441C	Mother
AO0557E	AP2442C	Son
AO0558E	AP2443C	Sister
AO0559E	AP2444C	Father
AO0560E	AP2445C	Son
AO0561E	AP2446C	Unknown
AO0562E	AP2447C	Brother
AO0563E	AP2448C	Brother
AO0564E	AP2449C	Sister
AO0565E	AP2450C	Mother
AO0566E	AP2451C	Son
AO0567E	AP2452C	Father
	AP2455C	Son



You Can Solve it Too

Student Exercise

- 1 TrueAllele database server
 - 12 interpretation processors
 - 20 students (3rd training day)
- Task: have each student use TrueAllele to identify the victim remains

Student Exercise

15 victim items → 15 victim genotypes
16 family items → 16 family genotypes
16 family references → 16 kinship genotypes

15 victim genotypes x 16 kinship genotypes = 240 genotype comparisons

240 comparisons x 20 students = 4,800 total comparisons

before lunch:	students upload genotypes
during lunch:	TrueAllele solves the problems
after lunch:	students review identification results

Conclusions

TrueAllele identifies victim remains using kinship genotype inference.

The TrueAllele approach is:

- Automated
- Informative
- Easy to use
