



中华人民共和国公安部物证鉴定中心

Institute of Forensic Science Ministry of Public Security, P. R. China



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专业培训 & 技术交流

HIDS 2018

Routine DNA analysis of challenging casework samples

Institute of Forensic Science, Ministry of Public Security, China

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03-05-2018. Roma




Challenging casework samples





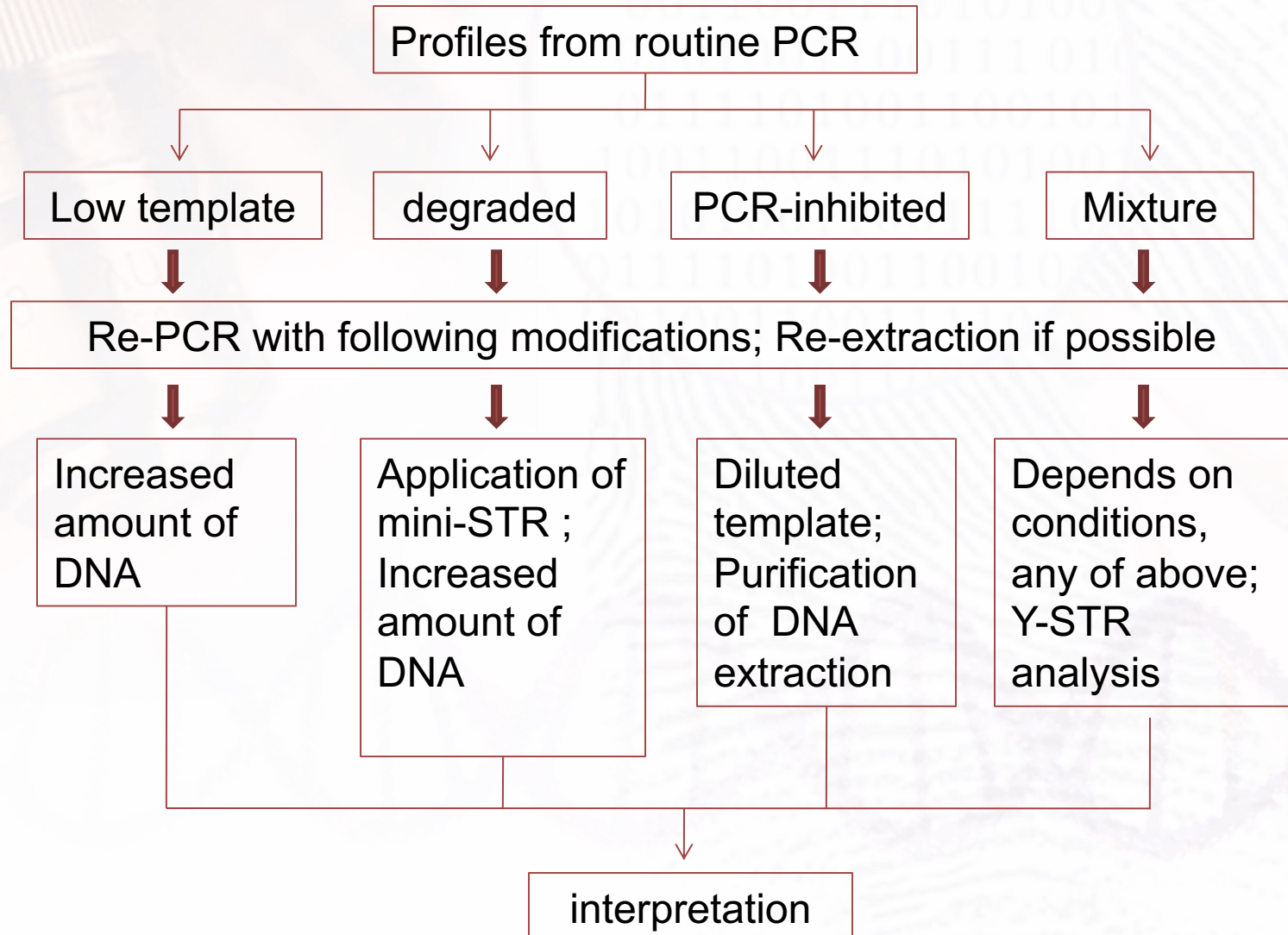
Workflow overview in IFSC



Sampling	Luminol; Multiband light; magnifier/Microscope; Hb/PSA strip cut/shear /stick by tapes/sweep by cotton or flocked swabs;
Extract DNA	magnetic beads /silica membrane method, manual or automatic; MagAttract M48 DNA Manual Kit /AutoMate Express System KingFisher FLEX/Hamilton Autolys System
PCR	Combined application of many STR kits; parallel /template-gradient /template-diluted PCR, depends on DNA condition;
CE	Post-PCR purification of PCR products, modification on CE parameters, if necessary.
Data analysis	Genemapper ID-X, following the rules of LtDNA typing;

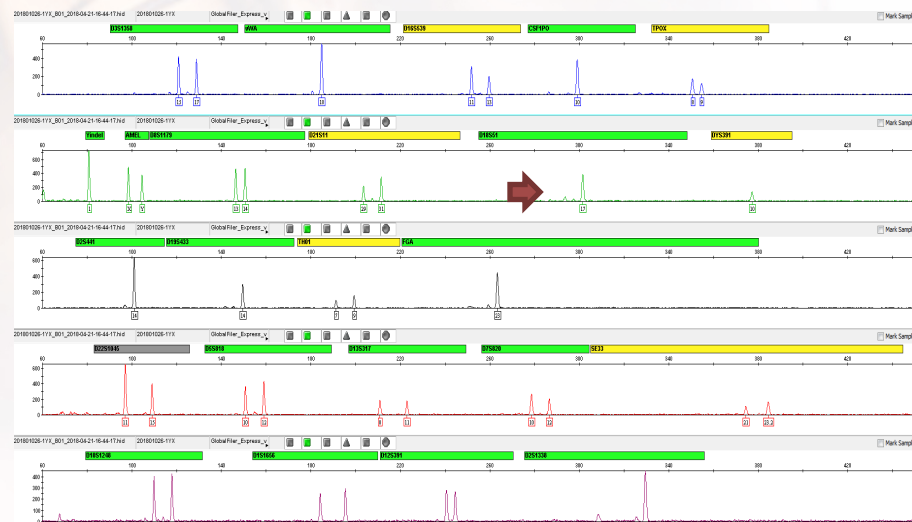


Strategy for poor quality DNA analysis in IFSC

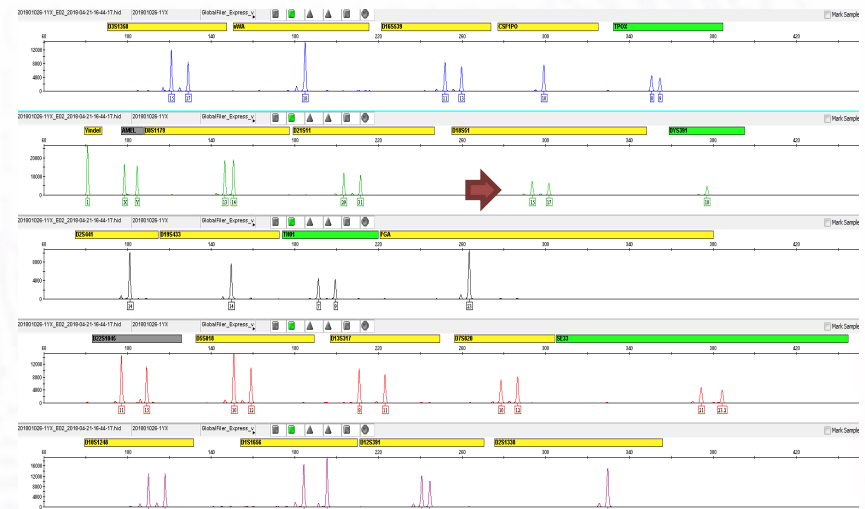




Amplification with increased amount of DNA



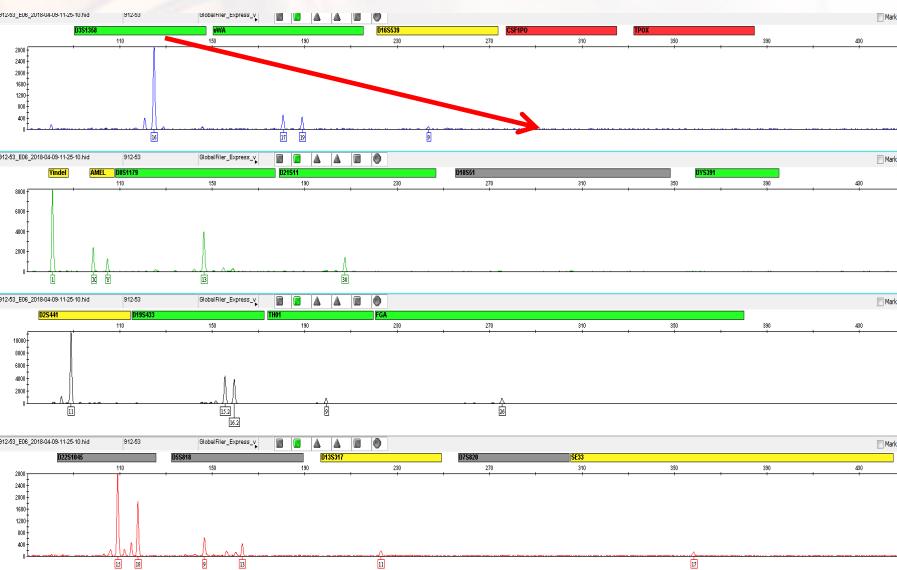
1 ul DNA solution as template



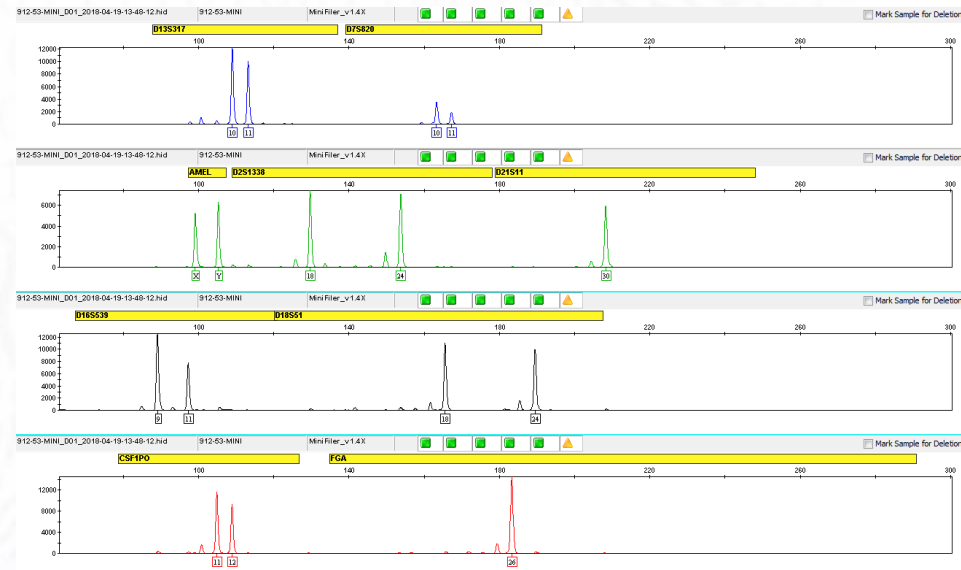
4 ul DNA solution as template



Application of mini-STR kit



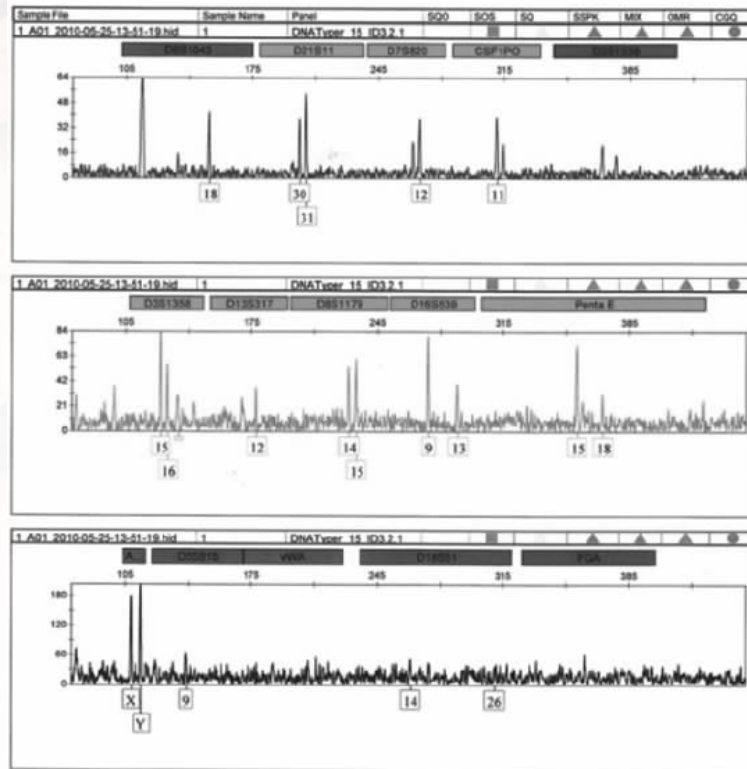
A profile from degraded sample



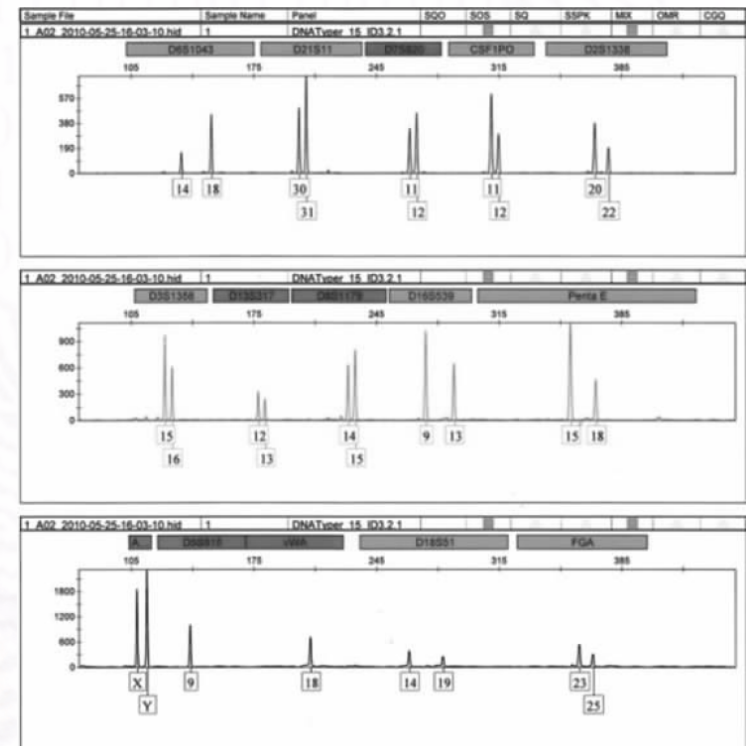
MiniFile profile from same sample



PCR product purification



No purification



Purified by Amicon Ultra-0.5 (100K) filters



Mixed DNA interpretation in IFSC

Present :

Empirical statement; number of contributors, peak height ratio, drop-in and drop-out taken into account; giving a conclusion: exclusion or can not be exclusion;

Future :

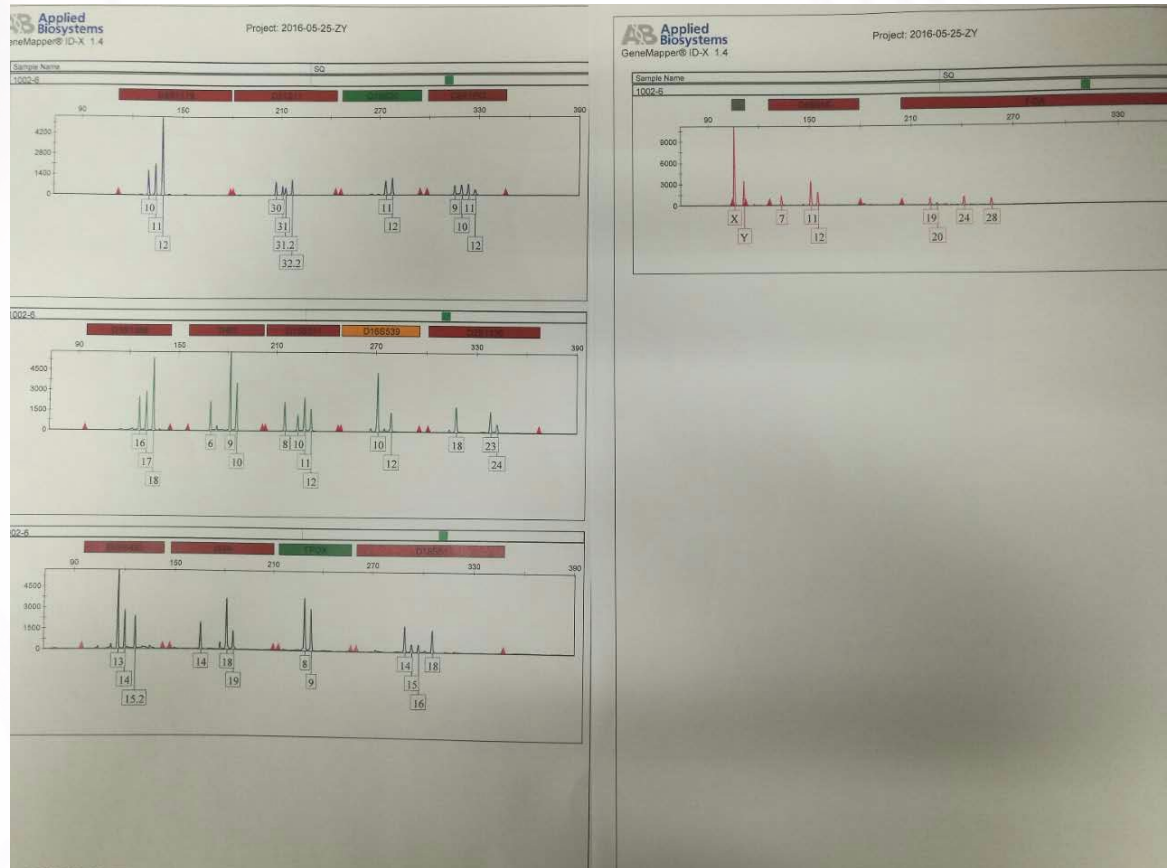
Calculation of LR; Softwares are under assessment and validation ;

Mixture separation:

two-person mixtures; major and minor contributor; profile of one contributor is available;



A case of manual mixture separation





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	D8S1179	D21S11	D7S820	CSF1PO	D3S1358	TH01	D13S317	D16S539
Victim (contributor1)	10/12	30/32.2	12	11/12	17/18	9/10	8/12	10
Suspect (contributor2)	11/12	31/31.2	11/11	9/10	16/18	6/9	10/11	10/12
	D2S1338	D19S433	vWA	TPOX	D18S51	D5S818	FGA	Amel
Victim (contributor1)	18/23	13/15.2	18/19	8/9	14/18	11	19/28	X
Suspect (contributor2)	18/24	13/14	14/18	8/9	15/16	7/12	20/24	X/Y

Mixture
separation



Database
hit



Arrestation
confession



STR analysis of old/burnt bones

Bone samples



Grinding in low temperature(liquid nitrogen)

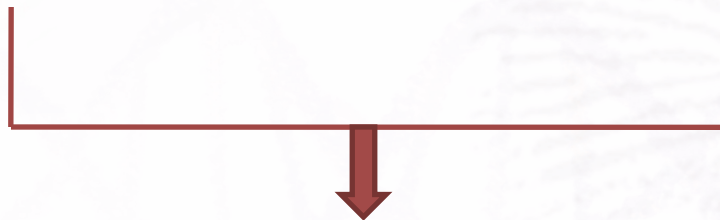
Decalcification of bone powder by EDTA



A:Lysis of decalcified bone powder
and extract DNA



B:Concentrate decalcification supernatant
into a smaller volume and extract DNA



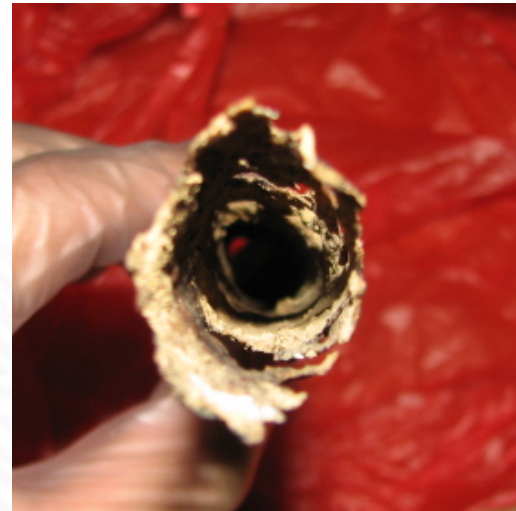
Final DNA: a combination of A and B



A case of old bone analysis



Surface of the bones



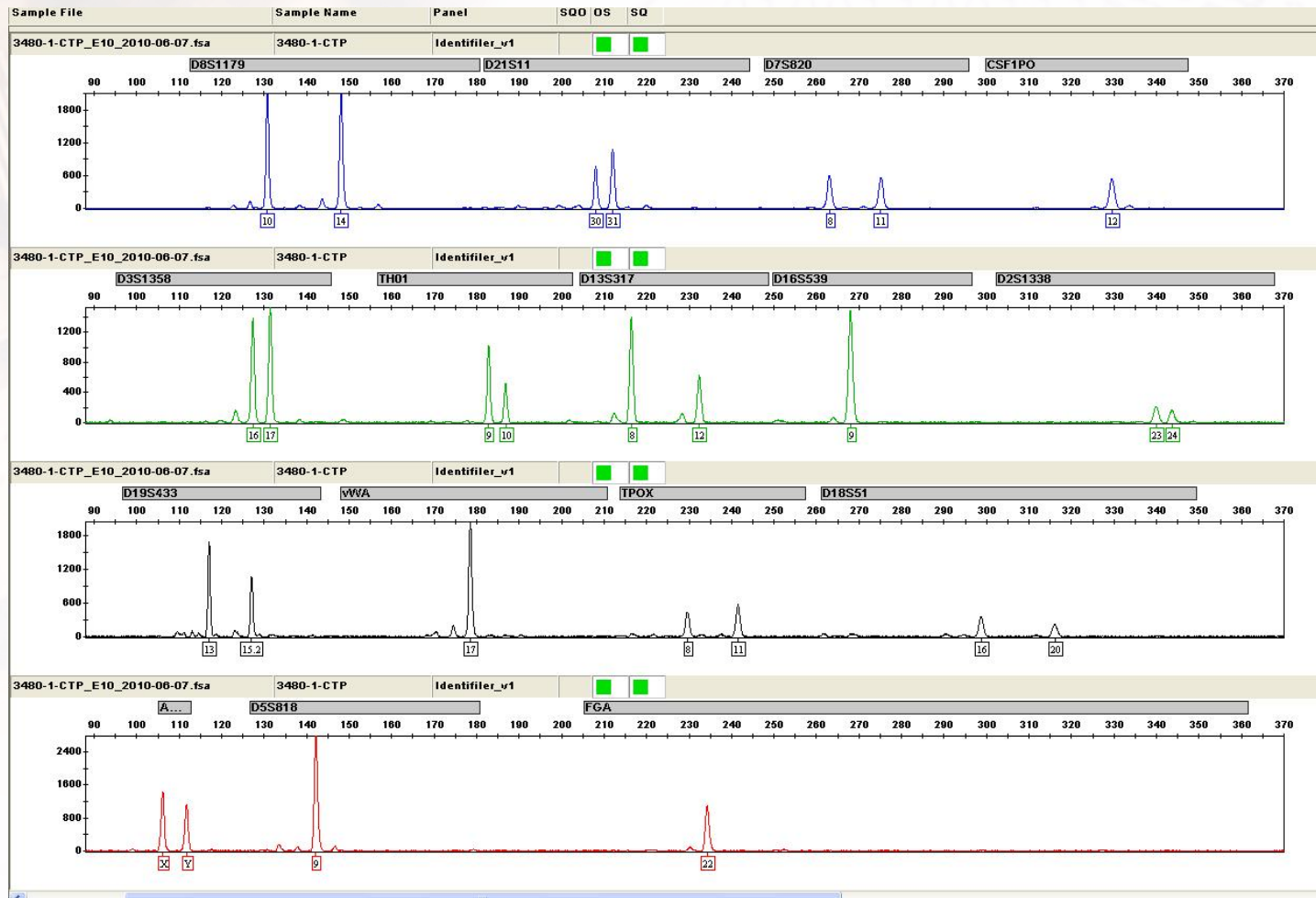
inner of the bone



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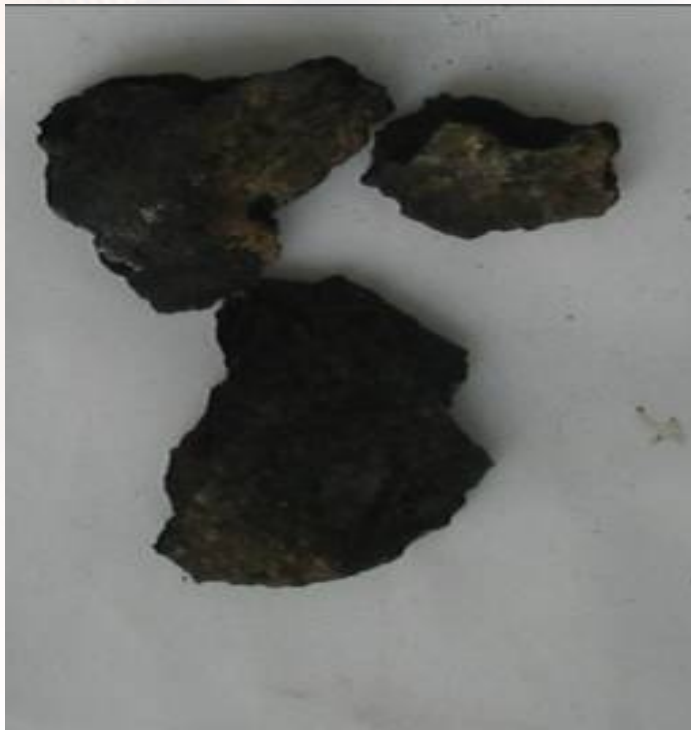
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A Identifiler[®] profile of the bone

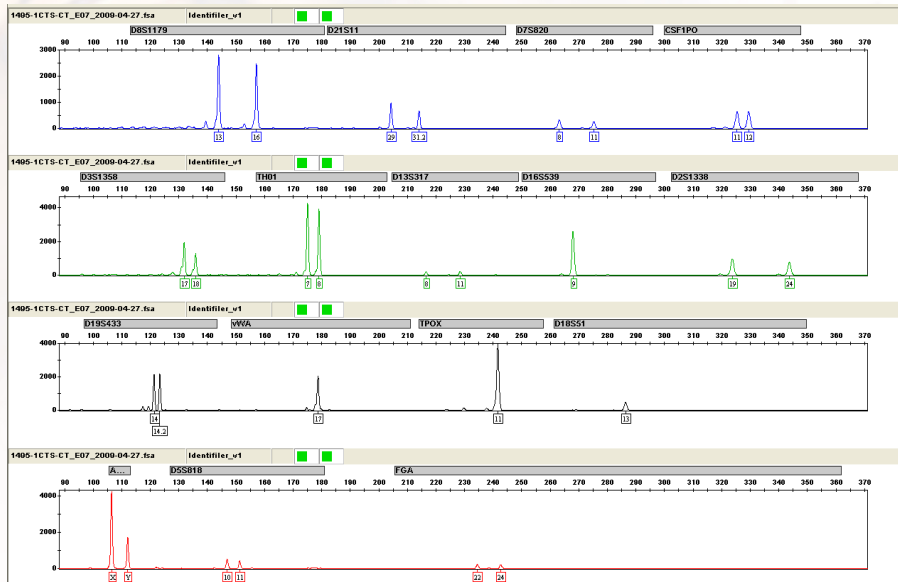


A case of burnt bone analysis



Burnt bones

1st: Forensic anthropology analysis identified the bones as human bones



Burnt bone profile

2nd: DNA analysis identified the bones were from the victim(compared with wife and son)



Efforts to minimize risk of contamination

- Implementation of strict procedure ;
- Consumables under ISO 18385 certification;
- Database for elimination;
- Lims: Comparison with previous profiles;
- Profile repeatability: re-analysis if possible.



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**Thanks for your
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