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PGR/SEIDO/UEIDMS/871/2014

Our reference number: **SP159419**
GMI1409191

Innsbruck, 03rd December 2014

Expert Opinion

on DNA Analyses

1 Order

Based on an agreement between the Procuraduria General de la República, Mexico, and the Gerichtsärzte am Institut für Gerichtliche Medizin, a written expert opinion on forensic DNA analyses concerning missing person Alexander Mora Venancio related to Case PGR/SEIDO/UEIDMS/871/2014 is given.

2 Case circumstances

On November 13th, 2014, one bone sample (sample ID 27-29102014) was handed over to our laboratory by Lourdes Lopez Lucho Iturbe, PGR.

On November 14th, 2014, 134 DNA profiles related to 42 family groups were made available by Sara Monica Medina Alegría, PGR.

In addition, on November 20th, 2014, 135 DNA profiles related to 42 family groups were made available by Mercedes Doretti, EAAF.

Family group number 21 (PGR) consists of DNA profiles from the father (Ezequiel Mora Chora, sample ID 13MR5470-14) and two full brothers (Omar Mora Venancio, sample ID 13MR5471-14, and Hugo Mora Venancio, sample ID 13MR5472-14) of missing person Alexander Mora Venancio.

The above mentioned familiy group number 21 (PGR) corresponds to EAAF missing person code 3-005, family code 4-005, Ezequiel Mora Chora (Father, donor code IG013), Omar Mora Venancio (full brother, donor code IG014) and Hugo Mora Venancio (full brother, donor code, IG015)

3 Investigations

3.1 Inspection and description of the exhibits

15941901 – 27-29102014 Bone sample:

One piece of bone, about 4 x 4 x 1 cm packed in a paper tissue.
Furthermore packed in a plastic container labelled with: "27-29102014, 27-29102014".
Sp159409 to Sp159425 packed in a paperbox labelled with: "Indicio, evidencia, Fecha y hora: 0? Novembre, 2014, Número de indicio o evidencia: 13:35 pm., Número de registro (folio o llamado):, Domicilio exacto del lugar de los hechos y/o hallazgo, ubicación exacta del lugar en donde el indicio fue recolectado, descripción del material: A?. Rio Consulado 715, col., Santa Maria Insurgentes Del. C?témoc. C.P. 06450, México ?. F., Observaciones: 17 muestras de fragmentos, óseos embalados Indiuid?almente., Nombre completo sin abreviaturas del agente policia, perito o auxiliar responsable de la recolección y el embalaje: Biol. Martha Acela Vablez G?zález." and furthermore labelled with: "Columnus Para, filtral, Automate Express, ?, Martha Acela Val?e?, Carola Romanini, ?".

- 15941901 1: The bone was put into the bone extraction procedure and used for DNA analyses.

3.2 DNA Analysis (Reference: DNA Report attached)

The DNA analyses of the bone sample 27-29102014 (15941901 1) gave a male profile in all 16 loci investigated.

DNA profiles of the father and the two full brothers of missing person Alexander Mora Venancio were provided by PGR and EAAF. 16 loci are comparable to GMI data. PGR and EAAF data are concordant in the comparable range.

4 Biostatistics (Matching procedure)

Genetic family matching procedures using autosomal STR data gave very strong evidence for the victim profile mentioned above matching this family group.

The nuclear genetic data obtained from item 27-29102014 are consistent with the unidentified human remains belonging to a biological son of the father 13MR5470-14 (IG013) and a biological brother of 13MR5471-14 (IG014) and 13MR5472-14 (IG015).

Based upon allele frequency data for Caucasian population established by the GMI, the nuclear genetic data are at least 1 billion times more likely to be observed under the scenario that the unidentified remains originated from a biological son of the father 13MR5470-14 (IG013) and a biological brother of 13MR5471-14 (IG014) and 13MR5472-14 (IG015) as compared to the unidentified remains originating from an unrelated individual.

Remark: A possible paternal mutation can be observed between 13MR5470-14 (IG013) and 13MR5471-14 (IG014) at locus D8S1171.

5 Summary

5.1 One bone sample (27-29102014) was handed over to our laboratory for DNA analyses.

Furthermore, DNA profiles of references, namely of the father and two full brothers of missing person Alexander Mora Venancio were made available for matching procedures at GMI by PGR.

In addition, DNA profiles of references, namely of the father and two full brothers of missing person Alexander Mora Venancio were made available for matching procedures at GMI by EAAF.

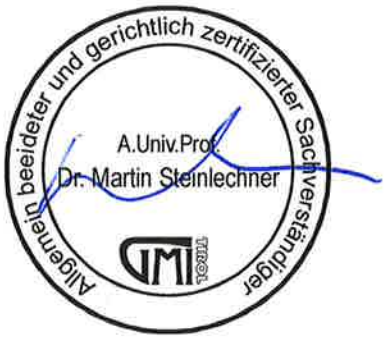
5.2 The DNA analyses of the bone sample (27-29102014) gave a male profile.

5.3 DNA profiles of the father and the two full brothers of missing person Alexander Mora Venancio were provided by PGR and EAAF. 16 loci are comparable to GMI data. PGR and EAAF data are concordant in the comparable range.

5.4 Genetic family matching procedures using autosomal STR data gave very strong evidence for the victim profile mentioned above matching this family group.

5.5 Based upon allele frequency data for the Caucasian population established by the GMI, the **nuclear genetic data are at least 1 billion times more likely** to be observed under the scenario **that the unidentified remains originated from** a biological son of the father (Ezequiel Mora Chora) and a biological full brother of the full brothers (Omar Mora Venancio and Hugo Mora Venancio) of missing person **Alexander Mora Venancio**, as compared to the unidentified remains originating from an unrelated individual.

Univ.Prof.Dr. Richard Scheithauer
Director of the Institute



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Our reference number: **SP159419**
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Innsbruck, 03rd December 2014

D N A - R e p o r t

1 Evidence items:

On 13th November 2014 we received exhibits collected from the Procuraduria General de la Republica. The purpose of the current investigation is to establish DNA profiles.

The analysed samples are listed in table 1:

Table 1:

Barcode	Sample
15941901 1	27-29102014, DNA Bone sample

2 The DNA-typing method:

Three main steps make up a DNA-analysis: The extraction of DNA (isolation of genetic material out of a stain), the amplification (replication of defined short segments of DNA) and the detection (identification of the individual type of DNA).

2.1. Extraction

2.1.1. Phenol-Chloroform-Isoamylalcohol Method [DEX06]

The samples were cleaned and purified prior to milling. The bone powder was subjected to lysis and the DNA was extracted according to the Phenol-Chloroform-Isoamylalcohol method. Then the DNA was purified and dissolved. In parallel, the extraction agents were included in the same procedure without addition of biological material in order to control the purity of the chemistry (extraction blind value). After the extraction step the concentration of genomic DNA was determined via rt-PCR.

2.2. Amplification

2.2.1. Description of the STR-loci investigated [DPC13, DPC18]

During PCR-amplification defined segments of DNA were replicated, which are called **Short Tandem Repeats** (STR`s). The STR-loci investigated are listed below:

STR-locus	Chromosomal localisation
D3S1358	3p
VWA	12p12-pter
D16S539	16q24-qter
D2S1338	2q35-37.1
D8S1179	8
FGA	4q28

D21S11	21q11-21
D18S51	18q21.3
D19S433	19q12-13.1
TH01	11p15-15.5
D5S818	5
D13S317	13
D7S820	7
CSF1PO	5
TPOX	2

The above mentioned STR-loci are accepted by the Forensic Community, scientifically investigated in detail and validated for forensic purposes with population studies performed in our institute.

2.2.2. Gender specific marker Amelogenin [DPC013, DPC18]

The PCR-system Amelogenin was used for gender determination of forensic samples. On the X-chromosome a 106 bp fragment of Intron 1 is replicated. The homologue fragment on chromosome Y is 112 bp long. Samples of female individuals are homozygous (XX), samples of male individuals are heterozygous (XY).

3 Detection [DVB03, DCE01, DCE02]

Amplified STR`s were separated by means of capillary electrophoresis and detected fluorescently.

4 Quality assurance

Together with the samples an extraction blind sample and a sample without DNA (amplification negative control) were processed in order to show the absence of any contamination of the chemicals used. Additionally, an internationally accepted DNA-Standard was amplified in order to control the quality of the PCR-chemicals and the performance of electrophoresis systems (amplification positive control).

The results of all analyzed samples including the control reactions of extraction (extraction blind value) and amplification (amplification positive and negative control) are stored as electronic records at the Institute.

The highest international standards are applied for the whole process. Our Institute successfully performs international proficiency tests for quality control.

5 Results [DAW01]

Usually the results of a successful typing of a sample are two alleles per STR-locus. This situation is called heterozygous. If the two alleles at a particular locus are the same, just one signal is observed, the situation is called homozygous. The designation of the alleles of the analysed STR loci is done according to an international nomenclature. The sum of the alleles of all analysed STR - loci of one sample is called DNA-profile or DNA-type.

The autosomal STR results (profiles) of the analysed samples are shown in tables 2a – 2d.

Table 2a:

Barcode	Sample	D8S1179	D21S11	D7S820	CSF1PO
15941901 1	27-29102014, DNA Bone sample	10/14	29/32.2	11/12	10/12

Table 2b:

Barcode	Sample	D3S1358	TH01	D13S317	D16S539
15941901 1	27-29102014, DNA Bone sample	15	7/9.3	9/10	10/11

Table 2c:

Barcode	Sample	D2S1338	D19S433	VWA	TPOX
15941901 1	27-29102014, DNA Bone sample	23	13.2/15.2	17	8/9

Table 2d

Barcode	Sample	D18S51	Amelogenin	D5S818	FGA
15941901 1	27-29102014, DNA Bone sample	16/25	X/Y	10/11	19/25

The analyses were finished on 1st December 2014.

6 Conclusions

The bone sample 27-29102014 (15941901 1) gave successful results in all sixteen loci investigated.

o.Univ.Prof.Dr. Richard Scheithauer
Director

A.Univ.Prof.Dr. Martin Steinlechner
Department Head