



Insights Into Interpol's I-Familia DNA Database To Facilitate Missing Person Identifications In Africa

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International police cooperation via INTERPOL







- International organization established in 1923
- INTERPOL General Secretariat in Lyon, France
- Legal framework and technical infrastructure for secure international police data exchange (I-24/7)
- National Central Bureau in each member country





INTERPOL Notices





Missing persons: a global phenomenon



25% of missing person cases have a transnational dimension (European Parliament 2016)



INTERPOL Notices

INFORMATION CONCERNING AN UNIDENTIFIED DEAD BODY

Control No.: D-124/10-2012

Requesting Country: Netherlands

File No.: 2012/338805

Date of Publication: 23 October 2012

Updated on: 3 June 2020









IDENTITY UNKNOWN

Sex: Female

Information pertaining to country of origin / nationality / Ethnic group / possible identity:

Some possible first names came to notice:

* Carina:

* Sue, a nurse from Derbishire/GB who should move to

Swiss in the years 1970-1980:

* Irani (phon.) a Brasilian woman;

* Maria a Colombian woman.

DNA profile:

DNA profile available.

Physical description

Height (cm): 165

Distinguishing marks and characteristics:

Length 160 - 170 cm. Normal/Stout built.

The body was a little decomposed. No sick defects. The body has several cut and stab wounds.

Aged 25-45 / Height 1.60 m-1.70m

Normal stature / Wavy dark blond hair, shoulder length. Recently bleached / Shoe size 37-37 ½ (4-4 ½)

Her uterus (womb) was surgically removed (scar on her abdomen)

Other personal effects:

The fingers of the victim were cut of so we do not have fingerprints but we are in the possession of prints of the palms of the hands.



2. DISCOVERY OF THE BODY

Discovery of the body

Discovery of the body			
Town	Country	Date	
AMSTERDAM	Netherlands	7 September 1992	

Circumstances of discovery

Between September 6th and September 10th 1992, the bodyparts of a woman were found in the water and on the sidewalk of the canals: Lauriersgracht, Egelantiersgracht and Prinsengracht in Amsterdam/NL.

Some of the bodyparts were put in a grey/blue suitcase (see pictures). The woman's head was not found.

Approximate age: 25 - 45 YEARS OLD Estimated date of death: 1 September 1992

3. PURPOSE OF NOTICE

IDENTIFY

To be treated as a request to identify a body.

Please send any information available to NCB THE HAGUE Netherlands (NCB reference: KLR-U-2012048818 of 16 October 2012) and the ICPO - INTERPOL General Secretariat.

INTERPOL BLACK NOTICE

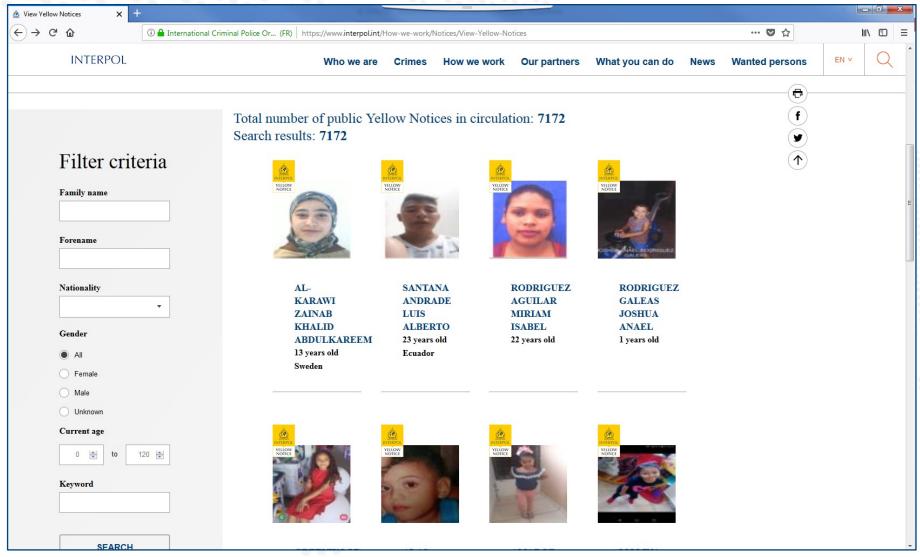
INTERPOL For official use only

Control No.: D-124/10-2012 Page 1/2 File No.: 2012/338805



Public Website:

https://www.interpol.int/How-we-work/Notices/Yellow-Notices





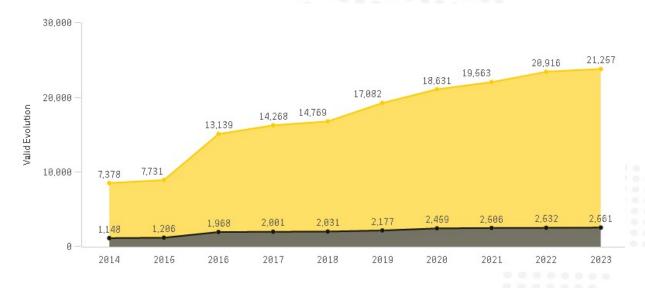
Notices and Diffusions

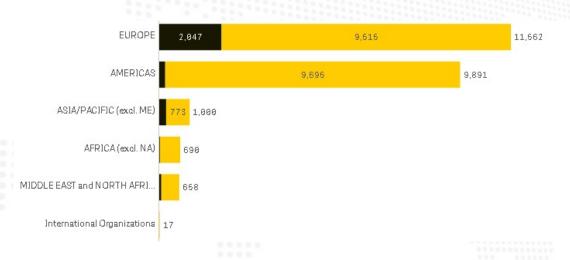


To help locate **missing persons**, often minors, or to help identify persons who are unable to identify themselves.



To seek information on unidentified bodies



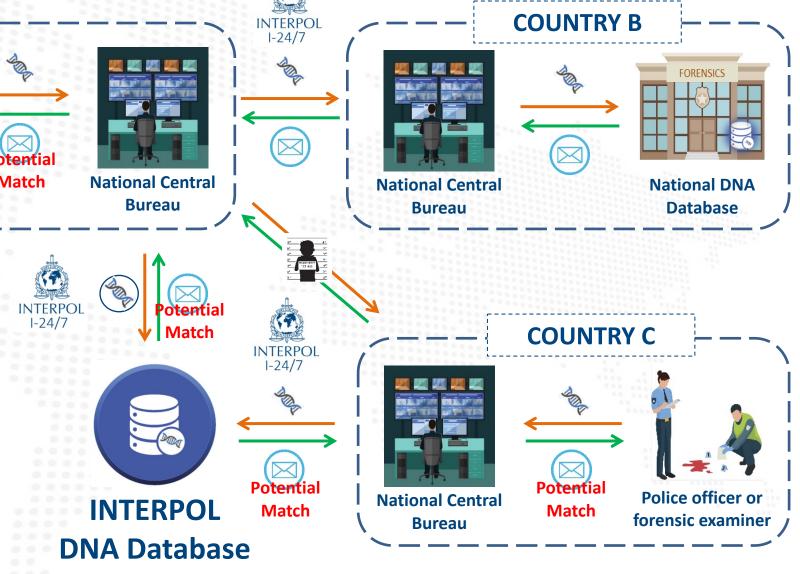




International police cooperation via INTERPOL



- from 87 member countries
- > 280,000 active DNA profiles
- 4 indexes:
 - Reference (suspect or convicted)
 - Crime scene
 - Missing person
 - Unidentified human remains
- Match report within 15 minutes





International DNA matching in INTERPOL Databases

DIRECT MATCHING



DNA from missing person: prior medical sample or personal item



DNA from unidentified body or human remains

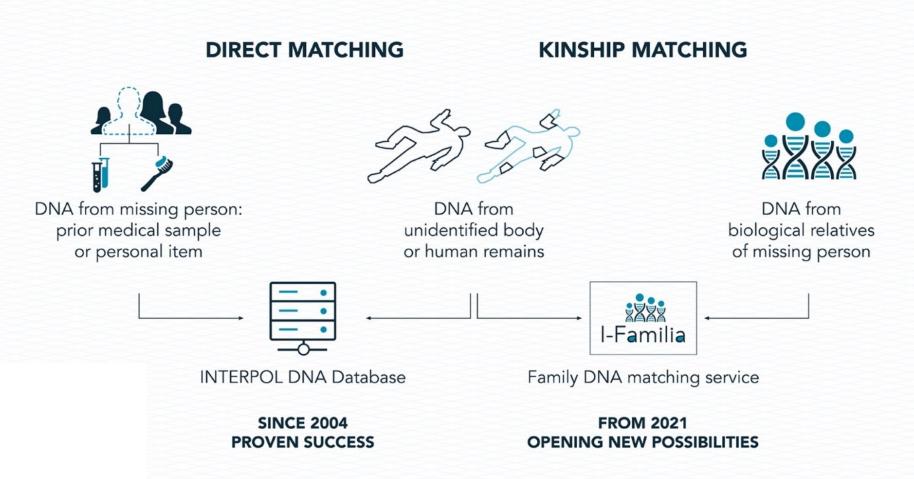


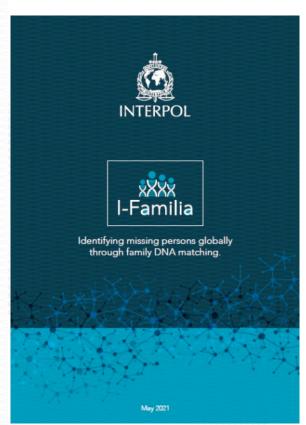
DNA of the missing person only available in 30% of international requests (Laurent et al. in preparation)

- Case is too old
- No personal item/medical sample available
- No DNA capabilities in the country

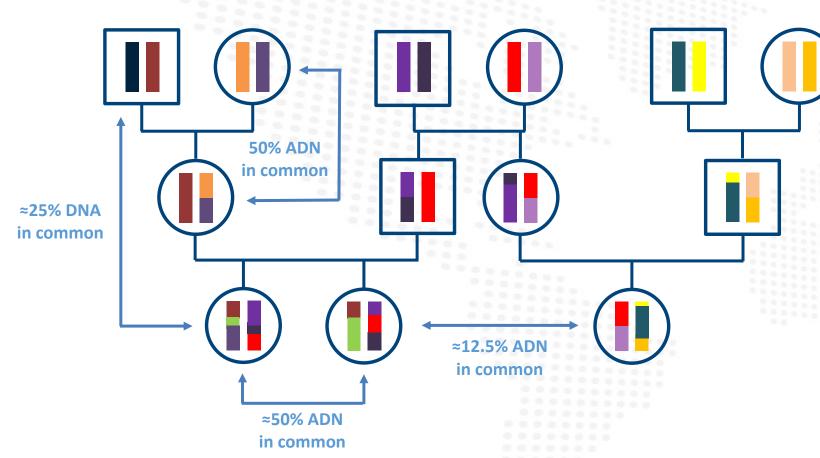


International DNA matching in INTERPOL Databases







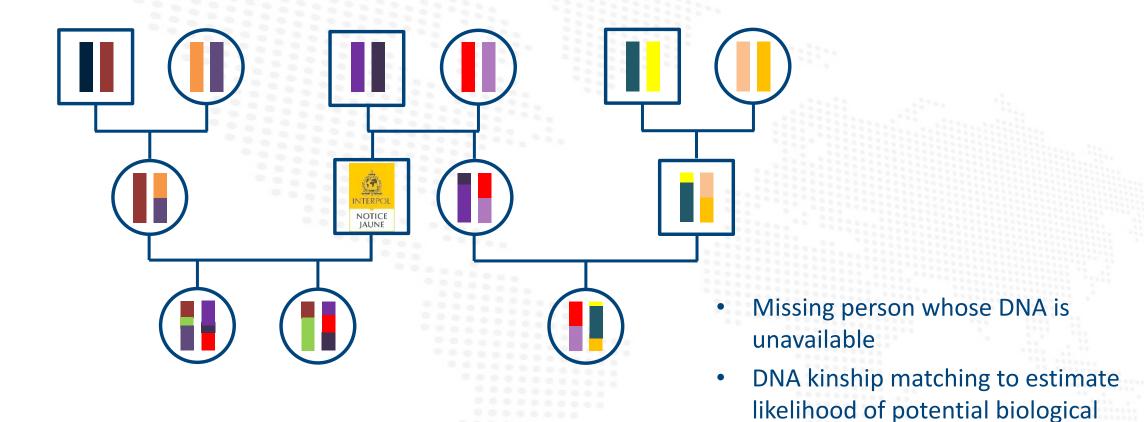


- Genetic inheritance
- All biological relatives from a same family share a part of their DNA
- It is possible to establish biological relationships based on DNA analysis
- Family DNA kinship matching

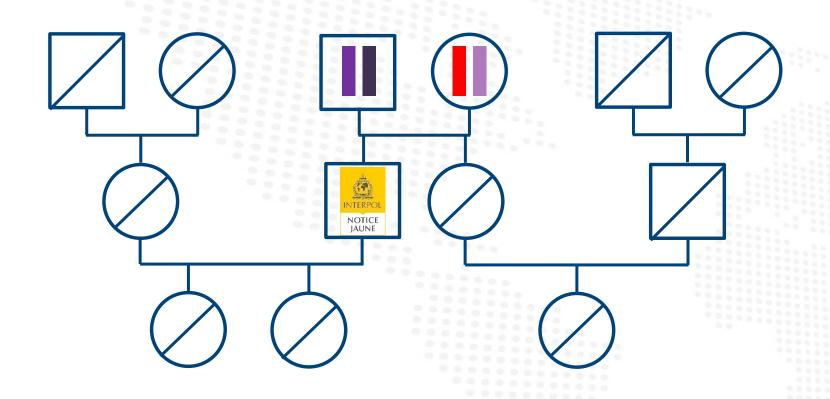


associations between the relatives of a

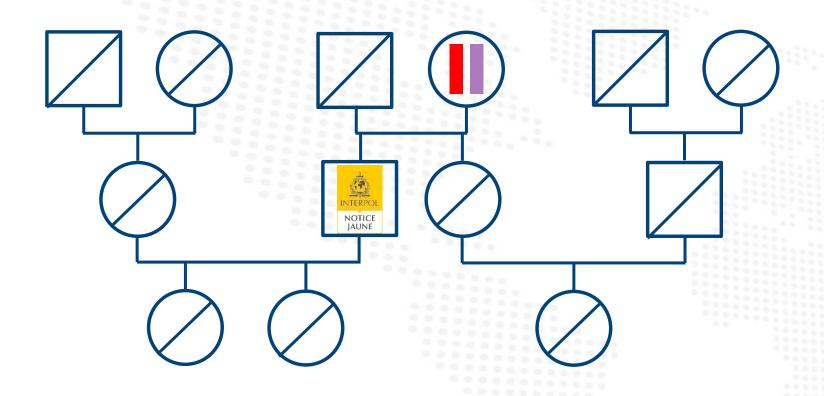
missing person and an identified body



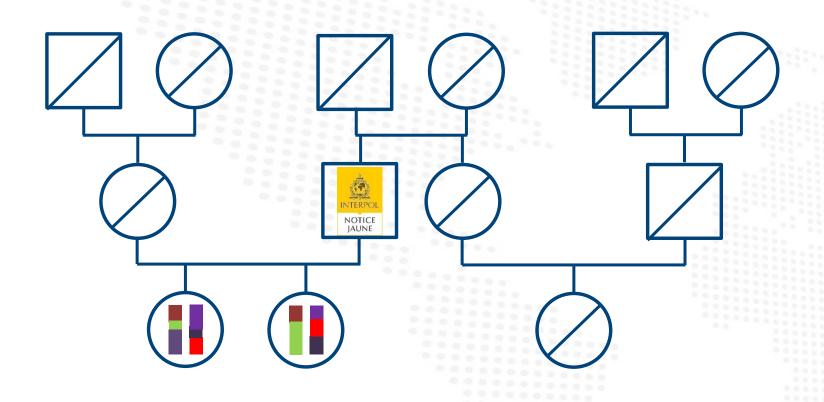














Family tree/pedigree **DNA kinship matching** Unidentified bodies or remains Complex statistical analysis Software needed to measure the fit of an unidentified human remains' DNA profile in a pedigree Need information on ancestry of the missing person (reference population) Able to measure fit for any type of family tree

Work with missing data and complex scenarios (consanguinity)

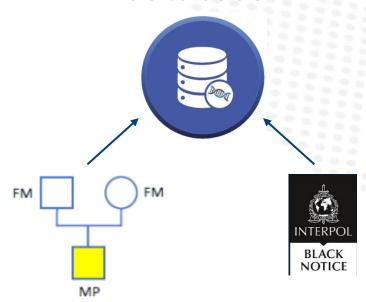


Family tree/pedigree I-Familia Unidentified bodies or remains Complex statistical analysis Software needed to measure the fit of an unidentified human remains' DNA profile in a pedigree Need information on ancestry of missing person (reference population) Able to measure fit for any type of family tree Work with missing data and complex scenarios (consanguinity)



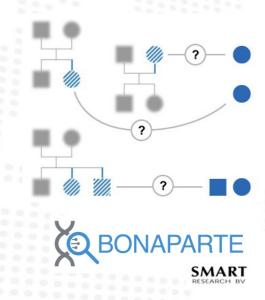
The 3 components of I-Familia

I-Familia DNA database



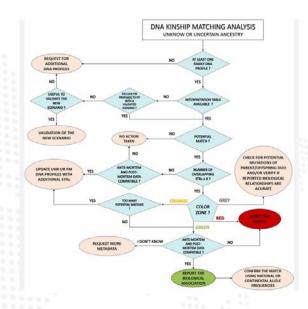
- No criminal DNA data
- No nominal information (only biological relationships, date and DNA profiles)
- Only accessible to the INTERPOL DNA Unit
- Retention period: 5 years for family DNA and 15 years for unidentified human remains

DNA kinship matching software



- Compare ante-mortem and postmortem DNA data
- All pedigrees accepted
- Calculation of likelihood ratio (LR)
- Propose a list of potential biological associations

Statistical interpretation

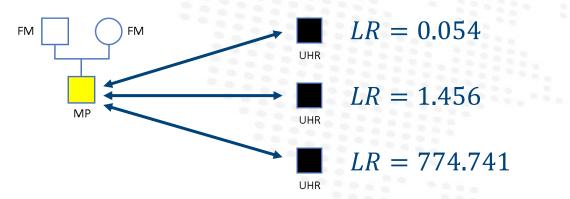


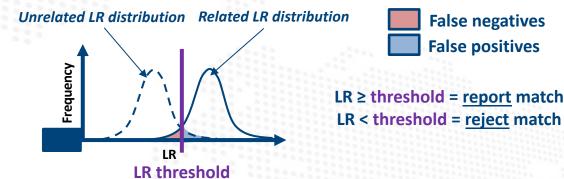
- Interpretation tables developed by INTERPOL
- Quickly evaluate the statistical relevance of the proposed associations
- Report to countries / Reject / Additional information required



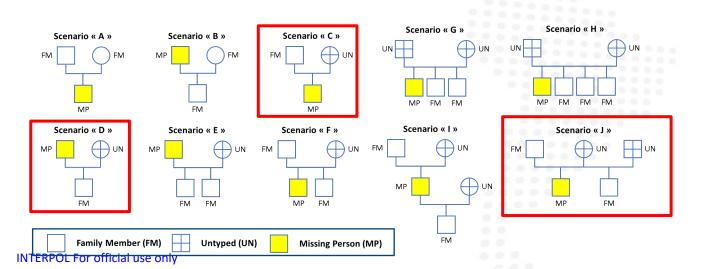
Challenges of international DNA kinship matching

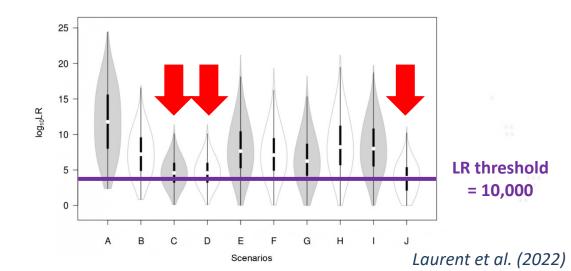
LR interpretation and report of potential biological relationships





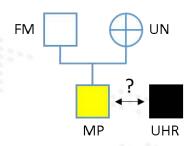
A unique arbitrary LR threshold is often applied to all DNA kinship cases regardless of the pedigree

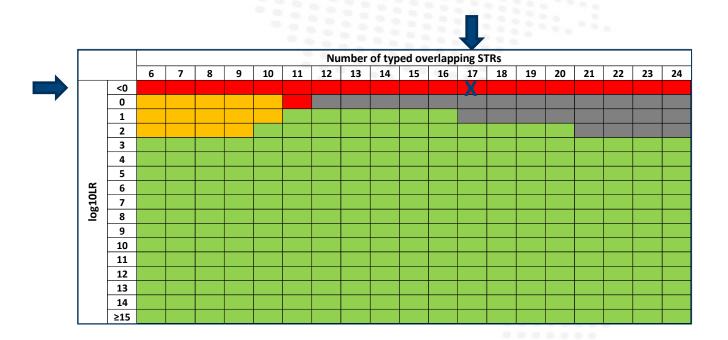






Interpretation table for scenario « C »



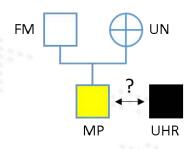


Reject the match

→ log₁₀LR value is too low to be considered



Interpretation table for scenario « C »





			Number of typed overlapping STRs																	
		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	<0																			
	0				X															
	1																			
	2																			
	3																			
	4																			
	5																			
~	6																			
log10LR	7																			
💆	8																			
	9																			
	10																			
	11																			
	12																			
	13																			
	14																			
-1	≥15																			

Reject the match

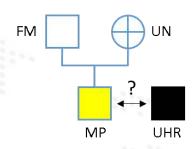
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Additional DNA data may be required

- → More than 50 adventitious matches (on average) per 100,000 UHR
- → High risk of heavy workload
- → Suggest adding another relative to the pedigree or include additional typed loci



Interpretation table for scenario « C »





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		2																			
		3															X				
	log10LR	4																			
		5																			
		6																			
		7																			
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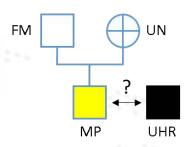
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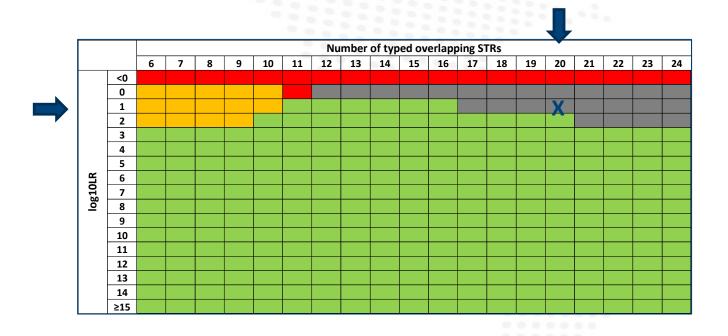
Review the potential biological association

- → Less than 50 adventitious matches (on average) per 100,000 UHR
- → Compare ante mortem and post mortem data



Interpretation table for scenario « C »





Reject the match

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Additional DNA data may be required

- → More than 50 adventitious matches (on average) per 100,000 UHR
- → High risk of heavy workload
- → Suggest adding another relative to the pedigree or include additional typed loci
- Review the potential biological association
 - → Less than 50 adventitious matches (on average) per 100,000 UHR
 - → Compare ante mortem and post mortem data
- Further interpretation may be required
 - → Risk of germinal mutation or drop-out
 - → Pedigree may not be accurate (half-siblings)



Scientific validation of I-Familia



Contents lists available at ScienceDirect

Forensic Science International: Genetics

journal homepage: www.elsevier.com/locate/fsigen

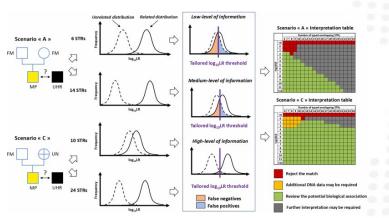


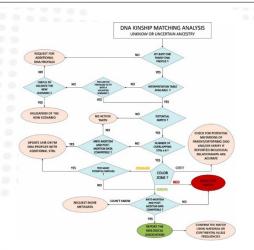
Research paper

Streamlining the decision-making process for international DNA kinship matching using Worldwide allele frequencies and tailored cutoff log₁₀LR thresholds

François-Xavier Laurent ^{a,*}, Andrea Fischer ^{a,b}, Robert F. Oldt ^c, Sree Kanthaswamy ^c, John S. Buckleton ^d, Susan Hitchin ^{a,*}

- ^a International Criminal Police Organization INTERPOL, DNA Unit, 200 quai Charles de Gaulle, 69006 Lyon, France
- b Landeskriminalamt Baden-Württemberg, Taubenheimstr. 85, 70372 Stuttgart, Germany
- ^c School of Mathematical and Natural Sciences, Arizona State University, Phoenix, AZ 85004, USA
- d University of Auckland, Department of Statistics, Private Bag, 92019 Auckland, New Zealand





- Peer-reviewed publication in FSI Genetics
- First international method to perform international DNA kinship matching (worldwide allele frequencies + θ correction)
- INTERPOL member countries can replicate the method nationally when ancestry is unknown
- Confirm match using national procedures (i.e. national allele frequencies)



How to send data?

- Contact your National Police → INTERPOL National Central Bureau
- Submit UHR and Family DNA Data to INTERPOL
- UHR using INTERPOL Black Notices or secured email via I-24/7
- Family DNA using the new I-Familia search request form
- Autosomal DNA (Y-STR and mtDNA optional)
- Statement of compliance and consent
 - The source hereby confirms that its provision of these DNA profiles of the missing person's relatives for their inclusion and use in the I-FAMILIA database, in accordance with the INTERPOL Policy on using family DNA profiles of missing persons for kinship matching, complies with its national law. The source further confirms that it has obtained the free, express and informed consent of the said missing person's relatives, or has national legal provision, for the purpose of international search.
- Mass-upload options (xlsx and xml) available

INTERPOL DNA SEARCH REQUEST FORM FAMILY MEMBERS OF A MISSING PERSON



This form can also be used to communicate family DNA profiles directly with selected member countries or international entities. The acceptance number countries to contact the selected recipients of the DNA profiles in order to be informed of their criteria

STATEMENT OF COMPLIANCE AND CONSENT

By submitting this form, the source hereby confirms that:

- All investigative steps to locate the missing person were taken nationally before requesting an international search
- The provision of these DNA profiles of the missing person's relatives for their inclusion and use in the I-FAMILIA database, in accordance with the INTERPOL Policy on using family DNA profiles of missing persons for kinship matching, complies with its national law.

Data and the INTERPOL Policy on using family DNA profiles of missing persons for kinship matching available at http://ic247.io/ic247

The family DNA profiles are kept in a separate database, called I-Familia, and will not be recorded in any other INTERPOL database. Family DNA rofles will not be compared against DNA data held by INTERPOL that has been provided for criminal purpos

addition to complying with the above conditions, your request must comply with the below criteria to be accepted

- The DNA profile must contain at least 10 full designated loci (Amelogenin is not included in the minimum number) and should be submitted with as many DNA loci as possible (loci are listed on pages FM1 to FM4).
- A decimal point must be used to delimit incomplete repeat units (e.g. 9.3). Commas should be avoided. In case of allele drop-out, type "NS" (Not Specified) in that locus or use your national nomenclature.

- If DNA profile from one or both parents of the missing person is available, fill in page FM1
- If DNA profile from a biological child is available, fill in page FM2 providing information of the other biological parent if possible. In case of multiple children, fill in one copy of FM2 per child.
- If DNA profile from sibling is available, fill in page FM3. In case of multiple siblings, fill in one copy of FM3 per sibling

In order to increase the chances of identifying human remains and to reduce false positive associations, special attention should be paid to the

choosing family members for missing person identification, depending on their availability. The list below ranks, genetically informative family members based on their relatedness which should be prioritized, if possible:

- Children of the missing person (include the DNA profile of the other biological parent if available
- Full siblings of the missing person (brothers or sisters)
 - All other distant family members, such as grandparents/grandchildren, half-siblings, aunts/uncles and cousins. In this case, the request

Please note that if the missing person is a male, it is advised to include at least one male family member from the paternal line (for Y-STR analysis)





INTERPOL Resolution on I-Familia





GENERAL ASSEMBLY - 90th SESSION

NEW DELHI, INDIA, 18-21 OCTOBER 2022





INTERPOL Resolution on I-Familia



Resolution No. 6

GA-2022-90-RES-06

<u>Subject</u>: Identification of missing persons through optimal use of INTERPOL's I-Familia database

The ICPO-INTERPOL General Assembly, meeting in New Delhi, India, from 18 to 21 October 2022 at its 90th session:

RECOGNIZING the increasing number of unidentified human remains and individuals in relation to missing person cases, global mass migration and human trafficking in INTERPOL member countries,

NOTING that many member countries have missing person investigations that cannot be solved and human remains that cannot be identified using their national systems alone,

ACKNOWLEDGING that the INTERPOL DNA Monitoring Expert Group recommends that identification efforts should apply equally to all and should not take into account a person's wealth, ethnicity or the circumstances of disappearance,

RECALLING INTERPOL's long-standing success in the direct matching of missing persons' DNA profiles with unidentified human remains data stored in the INTERPOL DNA database, and that countries are encouraged to provide INTERPOL both with missing persons' DNA profiles and unidentified human remains data,

FURTHER RECALLING that INTERPOL recommends – in the absence of the missing person's DNA – collecting and comparing the DNA profiles of family members of the missing person in accordance with national law and applicable procedures,

HIGHLIGHTING that INTERPOL's unique I-Familia missing person DNA database, launched in 2021, has already proved successful in helping member countries with the identification of missing persons through DNA kinship matching,

BEARING IN MIND that family members' DNA data are recorded in I-Familia for non-criminal purposes only without nominal information and is not connected to INTERPOL's criminal databases, nor compared against DNA data held by INTERPOL that has been provided for criminal purposes, Resolution No. 6 GA-2022-90-RES-06

EMPHASIZING that I-Familia and INTERPOL's DNA expertise in interpreting DNA matching results is available to all member countries,

CONSIDERING that for the purpose of providing scientific credibility and transparency to member countries, INTERPOL published a forensic peer-reviewed article on the scientific rationale behind I-Familia.

AWARE that accurate DNA data are crucial in order to maximize the effectiveness of I-Familia to help solve international missing person cases through DNA kinship matching,

MINDFUL of the need to comply with national legislation and procedures when sharing DNA profiles,

URGES member countries to make effective use of the I-Familia database, notably through:

- The lawful provision of DNA profiles of unidentified human remains in unsolved national investigations;
- The lawful provision of DNA profiles of biological relatives of missing persons who are the subject of unsolved national investigations:
- Ensuring that the data are accurate, regularly updated and in accordance with the legal and technical requirements as detailed in the I-Familia policy;
- Responding promptly and accurately to requests for further information following a
 potential biological association report issued by I-Familia;

ASKS that, where necessary, INTERPOL member countries consider making appropriate legislative and policy efforts, including amending existing legislation, to enable the storage and comparison of DNA profiles in the I-Familia database, in order to best meet and fulfil the purposes of the database

Adopted

INTERPOL

GENERAL AS

NEW DELHI, IN





GENERAL ASSEMBLY - 90th SESSION

NEW DELHI, INDIA, 18-21 OCTOBER 2022



INTERPOL Resolution on I-Familia





- The lawful <u>provision of DNA profiles of unidentified human remains</u> in unsolved national investigations;
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GENERAL ASSEMBLY - 90th SESSION

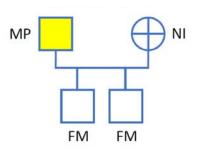
NEW DELHI, INDIA, 18-21 OCTOBER 2022





First international confirmed match with I-Familia

- October 2020
- Request from NCB Rome
- Missing Person since April 2004
- No DNA profile available for the missing person
- DNA profile from 2 children
- Upload of pedigree information to I-Familia





- April 2004
- Body found in Adriatic Sea by Croatian Police
- No fingerprints or face data
- DNA profile from human remains
- No match in National DNA database
- DNA profile shared by NCB Zagreb in April 2004

Confirmation of the missing person's identity by both NCBs



Potential match report

Dear NCB Colleagues,

Please be informed that a potential biological relationship has been identified using international DNA kinship matching through I-Familia, the new INTERPOL missing persons' family DNA database.

The potential biological relationship was found between 2 profiles submitted by your NCBs:

- The DNA profile barcode 2013-000829798472, submitted by NCB "A" on 27/09/2011, obtained from unidentified human remains.
- The DNA profile with the NCB reference 2021-43897539875, submitted by NCB "B" on 10/05/2021, belonging to the relative of a missing person.

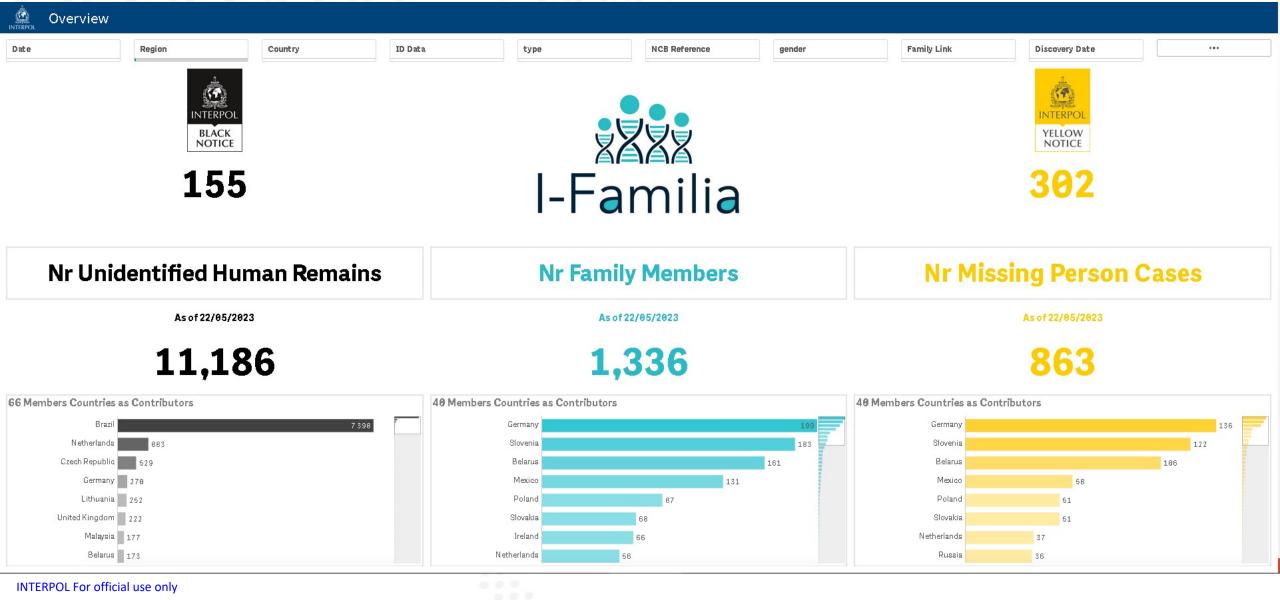
For your information, the log₁₀LR likelihood ratio calculated with the available pedigree reaches a value of 8.20, which is above the minimum value threshold set by INTERPOL allowing the report of promising biological kinship relationships. The match was found on 16 overlapping STR markers and with no mutation to be reported. Meta-data (dates of disappearance and discovery of human remains) were not available and therefore have not been cross-checked.

As this potential association could lead to the identification of the missing person and help bring closure to the family, we highly encourage your NCB to officially confirm the identity of the human remains using your national procedures.

- No information given on DNA profiles
- No information about the case / family pedigree and familial relationships
- Only the countries can decide if they wish to cooperate with the other source of data



STATISTICS FOR I-FAMILIA





I-FAMILIA MATCHES

Status	Date of I-Familia Match	INTERPOL YELLOW NOTICE	Family DNA Data	Likelihood Ratio
Confirmed	28 Oct 2020	2004	2 Sons	1.562×10 ⁸
Confirmed	12 May 2021	2011	Father	1.617×10 ⁸
Confirmed	15 Oct 2021	2009	1 Daughter	5.761×10 ⁶
Confirmed	04 July 2022	2018	Mother	2.836×10 ⁷
Confirmed	11 Aug 2022	2015	Mother, Brother	1.962×10 ⁹
Pending	16 Aug 2022	2019	Mother, Father	9.584×10 ²⁰
Pending	10 Nov 2022	2002	Mother	15.871

Verbal Scale:

Extremely Strong Support

Match Confirmation



31 January 2023: 4th confirmed match by I-Familia



Ireland - DNA from mother & sister of missing person



United Kingdom - Human remains caught in a commercial fishing net





Latest Match Confirmation



21 March 2023: 5th confirmed match by I-Familia



Slovakia - DNA from mother of missing person



Hungary – Body found in River Danube



BERTÓK DAVID

Rescue System Slovakia

November 28, 2021 / Bratislava region, Missing persons, District Bratislava I

MISSING PERSON - BERTÓK DAVID

David's mom begs to share again.

tacted his family

First name: David Date of birth: 17/03/1991 Nationality: SR Residence: Bratislava I

Date of declaration: 13/04/2018 Reason for search: Missing person Declaring department: OR PZ BA I





OPERATION IDENTIFY ME

























Seeking the names of unidentified victims of murder



Thank you for your attention

DNA@interpol.int