

## Mass Identification of Persons Missing from the Break-up of the Former Yugoslavia: Structure, Function, and Role of the International Commission on Missing Persons

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The staff of the International Commission on Missing Persons (ICMP) is attempting to undertake the largest mass human identification effort in history. Through the generosity of numerous governmental and private corporations the ICMP has established or is currently establishing a strong network of political allies, family outreach centers, and DNA laboratories throughout the former Yugoslavia. Furthermore, the ICMP is currently working to streamline current technology as well as employ new technology in its efforts to assist in identifying missing individuals. ICMP will continue to act as a link between the family associations in the region and will synchronize the work of the DNA identification process in the countries affected by the war in the regions of the former Yugoslavia. In the longer term, ICMP seeks to contribute to the closure of the missing persons issue, to raise awareness of the human dimension of the missing persons tragedy, and to preserve a shared and common memory of the missing in the former Yugoslavia.

**Key words:** *Bosnia and Herzegovina; Croatia; DNA; foreign aid; international cooperation; Kosovo; missions, official medical; war; war crimes; Yugoslavia*

There are more than 30,000 persons missing in the former Yugoslavia as a result of the conflicts during the past decade (1-7). Following the Dayton Agreement, signed in December of 1995 (7), the difficult process of recovering the mortal remains of those unaccounted for began in earnest. The International Commission on Missing Persons (ICMP) was created in 1996 at the G-7 Summit, in Lyon, France, with the exclusive focus of assisting the tens of thousands of families, regardless of their ethnic or religious origin, in determining the fate of loved ones lost during the wars. It is the first such structure of its kind to be effectively created in a post-conflict situation.

Perhaps the most exciting and certainly the most pioneering aspect of ICMP's work is the use of DNA technology for the humanitarian purpose of identifying victims of the conflicts in the regions. To paraphrase a writer for the Herald Tribune (July 7, 2000) who wrote an article about the ICMP last year, while mankind has been able to map the human genome, the ICMP is using DNA technology to map a human genocide. This paper will provide an overview of ICMP's programs with a particular emphasis on the DNA Program.

The long-lasting uncertainty regarding the fate of persons missing is a continuing source of anguish for the families and an obstacle to rebuilding society in the former Yugoslavia. Recognizing that the removal

of that barrier would require structures more permanent than ICMP could provide, a decision was made to create a network of forensic centers and DNA laboratories that would remain functional after the ICMP ceases official operations. These centers compliment other ICMP projects across the region.

These networks of centers and laboratories are designed to fulfill several important goals. Among these are the following: to increase the number of identifications, to develop a uniform approach to identification, and to set up a sustainable, long-term structure that is capable of continuing the identification process once the ICMP ceases official operations. The ICMP activities are divided into the following major areas: Political, Forensics Program, Family Association Development, and the DNA Program.

### **Objectives of the International Commission on Missing Persons in the States that Emerged from Former Yugoslavia**

#### *Political Objectives*

The political objectives of the institute are to intensify government efforts to release information on the whereabouts of missing persons and to smooth the path for the implementation of ICMP programs. In addition, part of the mission of the ICMP is to ensure that the local actors assume increasing responsibility

for operational and governance functions within the ICMP. Through the auspices of the ICMP, and for the benefit of the former Yugoslavia, international political issues relevant to the missing persons' are being pursued. These issues include ensuring uniform practices are followed in the exhumation process regardless of geographic location; and the establishment of centers, which are responsible for maintaining contacts with the families as well as keep the families up-to-date with regards to the exhumation and identification process; and installation and enhancement of DNA laboratories within the former Yugoslavia that will be part of the technical backbone for the identification process.

#### *Forensics Program*

The process of recovering and identifying mortal remains has proven to be the most effective method of resolving the fate of missing persons in the former Yugoslavia. For the past three and a half years, the ICMP has provided financial support for the recovery and identification operations in Bosnia and Herzegovina (BH), as well as supplies and equipment required by local expert teams. ICMP has also engaged international organizations to provide forensic expertise to assist these teams (ie, Physicians for Human Rights and Kenyon International Emergency Services).

ICMP's forensic program was formally established in the year 2000. Since that time, ICMP has assumed direct management of its recovery and identification projects throughout the region. On January 1, 2001, the Office of the High Representative transferred responsibility for coordination of the inter-entity exhumation process in BH to the ICMP. Managed by the forensic program, this process entails close cooperation between the missing persons commissions of the Federation of Bosnia and Herzegovina and the Republika Srpska, as well as various international agencies involved in the exhumation process.

In 1999, ICMP expanded its forensic program to include Kosovo. ICMP played a key role in United Nations Mission in Kosovo (UNMIK's) Victim Recovery and Identification Commission, and provided start-up funding for this commission. It has also supported the collection of antemortem data and blood samples for DNA analysis and the establishment of a centralized antemortem database for Kosovo. More than 2,000 antemortem records were completed by two nongovernmental organizations (NGO) working under contract with ICMP, and approximately 2,400 blood samples collected.

In order to meet the demands of recovery and identification efforts, ICMP's forensic program provides support for the expansion of forensic capacity within the region. Funds have been dedicated to the construction or renovation of facilities for the storage and examination of mortal remains. The Podrinje Identification Project facility in Tuzla, for example, was built by ICMP to house the remains of victims from the area of Srebrenica. There are currently 4,420 bags of human remains stored in the Podrinje Identification Project facility; to date examinations of more than 1,700 bodies have been completed (including collection of DNA samples).

The forensic program has also encouraged the development and implementation of standard operating procedures for recovery and identification operations. Thus ICMP has purchased the software site license that would allow use of Interpol's Disaster Victim Identification forms and the associated database throughout the countries of the former Yugoslavia. ICMP has provided a copy of this database to the UNMIK Police Missing Persons Unit in Kosovo, and will provide copies to additional centers as required. Training and equipment will be provided for select centers where this database may prove useful.

#### *Family Association Development*

The objective of the Family Association Development Program is to work with associations of missing persons to help them raise awareness on the issue and to increase the association members' civic initiative and advocacy capacity to address missing persons' issues. Programs with the family associations include (a) regional conferences and coordination meetings in order to develop cooperation and organizational linkages among associations of families of missing persons from Croatia, BH and Serbia-Montenegro (including Kosovo) in order to recognize mutual goals and develop joint activities; (b) project grants and short-term material assistance to family associations of the missing to strengthen their operational capabilities to lobby decision makers, inform their members, and educate the public on the missing persons issue; and (c) training workshops to build the organizational capacity of associations, so that they can work and communicate more effectively.

#### *DNA Program*

The DNA program is a pioneering component of the ICMP that will use various DNA testing methods to accelerate the identification process. By combining several recent advances in DNA technology and automation, it is possible to significantly decrease both the cost and the processing time of forensic DNA testing.

*Bosnia and Herzegovina.* One of the most basic, and, in BH, still unknown factors involved in designing an identification program, is the number of missing persons. The International Committee of the Red Cross (ICRC) compiled a list of the missing in BH, based upon the submission of tracing requests by family members. The guidelines required for a submission of a tracing request stipulate that the individual submitting the request must be a close family relative of the missing. If the entire family were missing, there may not be any close relative left to submit such a request. In addition, if the family knows the location of their deceased loved one, they may not submit a tracing request. At the current time, the ICRC list of the missing in BH has a total of approximately 20,500 individuals. In BH, more than 10,000 bodies have been recovered since 1996 and, of these, slightly more than half have been identified via non-DNA techniques. Although statistics are not readily available, thousands of bodies were also recovered prior to 1998, many of which require DNA testing for identification. All together, since 1995 there have been

roughly 5,000–6,000 bodies recovered in BH that will require DNA testing for identification. Of the bodies that have been identified to date in BH, around 30% of these individuals are on the ICRC list of the missing. However, this probably does not mean that the ICRC list of the missing is short by around 70%. This appears to be unlikely. In reality, the losses in BH can be considered to be a series of multiple loss incidents, instead of one massive loss of life incident. For example, the fall of Srebrenica in July of 1995 witnessed the disappearance of between 7,000–10,000 individuals. The ICRC initiated an intensive effort to collect tracing requests relating to this incident. Subsequent initiatives indicate that the ICRC list of the missing from the 1995 fall of Srebrenica contains between 90–95% of the actual number of individuals lost. Other loss incidents, especially those that occurred in 1991–1992, seem to hold a much lower correlation between the ICRC list of the missing and the actual number of missing. Based upon current research by the ICMP, it appears as though the number of missing in BH is more than 30,000.

In order to develop an in country DNA testing capability that will have the potential of testing tens of thousands of skeletal elements and associated blood references, the ICMP DNA Program will incorporate the following: (a) a network of Family Outreach Centers to collect blood references from living family members; (b) DNA laboratories to extract and test DNA from bone and blood specimens; and (c) training for local scientists in state-of-the art DNA identification technology.

*Family Outreach Centers.* The family outreach centers are located in regions that have large numbers of families who are missing loved ones, which permits staff members to more easily locate such family members. The family outreach centers take information and blood samples from living relatives regardless of ethnic or religious affiliation. Currently, the ICMP has operational family outreach centers in Tuzla (the Headquarters of the family outreach centers), and branch centers in Sarajevo, Banja Luka and Sanski Most. A fifth and final family outreach center in BH is scheduled to be opened during the spring in Mostar.

Blood samples are collected via a small prick to a finger and the blood sample is placed upon a Schleicher & Schuell's (Dassel, Germany) bloodstain card. All blood samples collected at these family outreach centers are sent to the Tuzla headquarters for initial computer entry and sample storage. At the Tuzla family outreach center, each blood sample, and accompanying paperwork, is bar coded. In order to obtain a DNA profile, a small punch from the bloodstain is sent to a DNA laboratory. The bar code is the only identifying information accompanying the bloodstain. By performing this "blinding" of the specimen, it is not possible for anyone to effectively claim discrimination based upon the ethnicity of the donor. Only at the Tuzla headquarters will the resulting DNA profile and donor name be matched. Case workers – the individuals who collect the blood sam-

ples – from all three ethnic groups work side by side in the Tuzla headquarters, which has a staff of 22 personnel. Once the Mostar facility is operational, there will be approximately 40 family outreach centers employees in BH.

The blood collection efforts of the family outreach centers in BH began in June of 2000 with the opening of the Tuzla headquarters. With four of the planned five centers open by the end of December of 2000, blood collection efforts were underway throughout BH. By the end of March of 2001, these four centers were collecting an average of 70-90 blood samples per working day. The family outreach centers work closely with the organizations of families who are missing loved ones to collect information about the missing person as well as contact information for potential blood donors for these missing individuals. By the end of March 2001, the family outreach centers had collected contact information for over 75,000 potential donors, which represents approximately 18,500 of the missing. A folder is produced for each of the missing, containing the contact information for potential donors. Each potential donor is listed as either a mitochondrial DNA (mtDNA) or nuclear DNA donor, or both. Blood samples for that missing person are collected until a mtDNA donor has been sampled, as well as a sufficient number of nuclear DNA donors to achieve a "complete" nuclear DNA donor case. The definition of a complete nuclear DNA case for a missing person is dependent upon the availability and relatedness of potential nuclear DNA donors. For example, in some cases both parents are still alive. In other cases, one or both of the parents may be deceased, but a spouse and children may be available.

*DNA Laboratories.* The DNA program currently has laboratories within BH at Tuzla and Sarajevo with a third facility, located in Banja Luka, to begin operations in the summer of this year. The Tuzla DNA laboratory, with an initial staff of six, will be dedicated to large scale testing of blood specimens. The Sarajevo DNA laboratory, with a staff of 12, will be dedicated to the processing of bone specimens from non-presumptive identification cases and the Banja Luka DNA laboratory, with an initial staff of four, will concentrate on the testing of presumptive cases. To date, 10 of these scientists have been sent out of country to a fully functional DNA laboratory for training. All DNA profiles that are obtained in any of these centers will be submitted to a central DNA database located in the Tuzla family outreach centers headquarters.

At the current time, two multiplex short tandem repeat (STR) systems (Ampf/STR Profiler Plus™ and Ampf/STR COfiler™) from Applied Biosystems in Foster City, California, USA (8), and one megaplex STR system (PowerPlex™ 16™) from Promega in Madison, Wisconsin, USA, are in the process of validation. In addition, one Y-chromosome STR system (Y-Plex™ 6), also from Promega, is currently being validated. Since over 90% of the missing are male, Y-chromosome testing may prove to be highly beneficial (9). For mtDNA testing, standard control region sequenc-

ing as well as a Roche developed mtDNA strip will be investigated.

**Croatia.** Within Croatia, there are three DNA laboratories, located in Zagreb, Split, and Osijek, which are involved in testing cases of missing persons. The Split DNA laboratory was established independently (10), but has since become involved in National program, whereas the Zagreb and Osijek DNA laboratories were funded and developed by the Croatian government.

The ICMP has aided this system by donating DNA equipment. This initial donation consisted of 2 ABI DNA sequencers (377 models) and 3 ABI thermocyclers (9700 models) and a limited quantity of DNA reagents. In addition, the ICMP will hire and fund a contractor to renovate the DNA laboratory in Zagreb and negotiations are currently underway to fund the hiring of additional staff members for each of these DNA laboratories, as well as the purchase of additional supplies and equipment. The ICMP opened an office in Zagreb on April 2, 2001.

**Federal Republic of Yugoslavia.** Within Serbia, ICMP is currently in negotiations to establish a DNA facility and a Family Outreach System in Serbia. At this time, officials in Serbia have stated their agreement with the ICMP strategy and both the DNA laboratory and blood collection operations should be functional by the end of summer to early fall. An ICMP office was opened in Belgrade in March of 2001.

In Kosovo, the ICMP funded the Transcultural Psychosocial Organization to collect *ante mortem* data and blood samples from the families of the missing. As of February 1 of this year, these functions became part of an ICMP family outreach centers as the Transcultural Psychosocial Organization office in Prishtina and its staff transferred to the ICMP. The ICRC reports approximately resolved tracing requests in Kosovo. The goals of the ICMP in Kosovo are to continue the blood collection efforts (over 2,000 blood samples have been collected to date) and to perform DNA testing on both the blood specimens as well as bone specimens. The ICMP does not plan to develop a DNA testing laboratory in Kosovo, but to take the samples out of country for processing.

### **Preliminary Results and Discussion of Human Identification**

The ICMP receives two types of cases for DNA testing, presumptive and non-presumptive. Presumptive cases are remains where a family member has recognized a personal item they believe belonged to the individual the family member claims is missing, or where some form of identification has been found on or near the body, and there is general agreement on physical characteristics between *ante mortem* and *post mortem* data. Non-presumptive cases involve remains where there is little or no information as to the identity of the exhumed individual.

The ICMP, in conjunction with the ICRC, developed and published a Book of Photos from cases associated with the 1995 fall of Srebrenica. This Book of

Photos contained digital photographs of personal items from 335 exhumed individuals, was widely distributed, and was viewed by slightly more than 2,000 family members. Of these two thousand viewings, 135 families recognized various items. After these initial recognitions, the lead pathologist of the Srebrenica cases interviewed these families, compiled *ante mortem* data, and compared this information with the *post mortem* remains. From these 135 recognition cases, 23 developed into a presumptive identification.

In order to get answers back to the families as quickly as possible, the ICMP sent presumptive cases out of country for DNA testing (to the Ludwik Rydygier University School of Medical Sciences in Bydgoszcz, Poland, and to the Armed Forces Identification DNA Laboratory in Rockville, MD, USA), including all 23 presumptive identification cases resulting from the Book of Photos. To date, the results of nine of the cases associated with the Book of Photos have been returned to the ICMP. Of these, five have resulted in a DNA match and four in an exclusion. Since September of 2000, the ICMP has sent a total of 313 presumptive identification cases out of country for DNA testing. Some of these cases were related to individual presumptive identification cases and other to group losses. Examples of group losses include several incidents in which the remains were removed from their primary burial site and reburied at a secondary site. After informants led investigators to the scene of the original burial site, only a few scattered bone fragments were able to be recovered. From these fragments, no individual presumptive identification cases could be developed. However, the informant was able to state who he/she thought had been buried at this primary site. By using this information, relatives of the individuals alleged to have been buried at the primary site had a blood sample taken. Multiple fragments of bone specimens from these sites and corresponding blood samples were tested and multiple DNA matches have been obtained from these cases. In addition, the ICMP has received DNA test results on 86 individual presumptive identification cases. Of these 86, 56 (65%) cases have supported the presumptive identification, 24 (30%) were exclusions, 2 (2%) were inconclusive, and no results were obtained on another 2 (2%) cases. For the cases in which no results were obtained, additional specimens will be sent. The two inconclusive cases were both tested via mtDNA. One displayed multiple mtDNA sequences (contamination) and the other had displayed a single nucleotide difference between the bone sample and the family reference. An additional bone specimen from the case that displayed contamination will be submitted for DNA testing. For the other inconclusive case, nuclear DNA has been obtained from the bone specimen and a nuclear DNA donor has been sampled for DNA testing.

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