END OF PROJECT REPORT

A. **Programme/Project number:** 09-02-05-3122 EA011

Programme Title : Human genome diversity

Project title: STR DNA profiling on random ethnic malay,Chinese and Indian population of Peninsular Malaysia using flurorescent labelled multiplex primers kits for use in human identification.

Programme Leader :

Project leader: S. Panneerchelvam

Tel: 609 -7663921 **Fax: 609 - 764 7884**

B. **Describe your project and highlight major project achievement**

Forensics- Micro satellite loci, generally known in forensic applications as Short Tandem Repeat (STR) loci, are widely used for forensic identification and relatedness testing, and are a predominant genetic markers in this area of application. In forensic identification cases, the goal is typically to link a suspect with a sample of blood, semen or hair taken from a crime. Alternatively, the goal may be to link a sample found on a suspect's clothing with a victim. Relatedness testing in criminal work may involve investigating paternity in order to establish rape or incest. Another application involves linking DNA samples with relatives of a missing person. Because the lengths of microsatellites may vary from one person to the next, scientists have begun to use them to identify criminals and to determine paternity, a procedure known as DNA profiling or "fingerprinting". The features that have made use of microsatellites attractive are due to their relative ease of use, accuracy of typing and high levels of polymorphism. The ability to employ PCR to amplify small samples is particularly valuable in this setting, since in criminal casework only minute samples of DNA may be available. The appilication of STRs in crime scene samples presupposes a database on the STRs to be used. The published data base on autosomal STRs pertaining to various population ethnic groups in Malaysia was sparse. Hence it was planned to compile a comprehensive database on the distribution of widely used STRs in forensics.

With this aim the project was conceived. We have choosen a Master student from Jabatan Kimia Malaysia, which institution is conducting the DNA profiling technique for Malaysian Law enforcement agencies. As per the project objective the data base was compiled on the three major population groups –Malay, Chinese and Indians and published in peer reviewed journals. Besides this population data base on Jawaneese population group living in Malaysia was also compiled and the data base was published in peer reviewed journal. *It is also relevant to state that in the School of Health sciences the human identification in immigration cases are undertaken routinely. The school of health Sciences conducted short term courses on request by the JKM and PDRM on DNA profiling techniques. Thus the School of Health Sciences is recognized as a center of excellence in DNA profiling techniques.*

C. Objectives achievement

- **Original programme/project objectives after approval**

1. To study the distribution pattern of various alleles of heritable STR markers.
2. To compile a data base for the validated 15 STRs in ethnic random Malay, Chinese and Indian populations of Malaysia.
3. To facilitate the application of the data base for human identification.
4. To establish a center for human identification in USM, Kelantan.

- **Objectives Achieved** (Please state the extent to which the project objectives were achieved)

1. The STR data fon 15 STRs were compiled for Malay, Chinese and Indian population groups in Malaysia as envisaged in the project. Besides this population data for jawaneese lipopulation group living in Malaysia was also compiled.

2. The school of Health S ciences ,USM, Kelantan is recognized as acenter for excellence in DNA profiling. Furthur the School of Health Sciences is Undertaking personal identification using STR data base in immigration cases.

- **Objectives not achieved** (Please identify the objectives that were not achieved and give reasons)

- **Achievement of overall objectives**

☐ √ Yes

☐ No

D. Technology Transfer/Commercialisation Approach

- **Commercialisation potential**

☐ Yes

☐ No

Please describe the approach planned to transfer/commercialize the results of the project

Not applicable

E. **Benefits of the programme/Project** (Please identify the actual benefits arising from the project as defined in Section III of the Application Form. For examples of outputs, organisational outcomes and sectoral/national impacts, please refer to Section III of the Guidelines for the Application of R&D Funding under IRPA)

- **Outputs of the programme/project and potential beneficiaries** (Please describe specifically the outputs achieved and provide an assessment of their significance to users)

The major beneficiaries of this project is the Law enforcement agencies –Police, customs, Immigration departments. This data is essential for application in day to day case work especially in the process of biological evidences received for analysis at Jabatan Kimia Malaysia(JKM).

The data base was compiled by a Master student, who is a working scientist involved in DNA profiling analysis in JKM, under our supervision. The data base on the three major ethnic population group is routinely used for processing biological samples from human origin. Hence the research work carried out by the School of Health Sciences has immense use.

- **Organisational Outcomes** (Please describe specifically the organisational benefits arising from the project and provide an assessment of their significance)

The data base created by the School of Helath Sciences made it to be recognized as a center for excellence in DNA profiling. Further the School is undertaking paternity related cases referred by immigration authorities.

- **National Impacts** (If known at this point in time, please describe specifically the potential sectoral/national benefits arising from the project and provide an assessment of their significance)

This data base has direct application in day to day case work and thereby helping police in Malaysia in crime detection and law enforcement.

F. Assessment of programme/project structure

- **Project Team** (Please provide an assessment of how the project team performed and highlight any significant departures from plan in either structure or actual man-days utilised).

The project team had excellent working relationship and all the work carried out without delay and without seeking any extra financial assistance.

- **Collaborations** (Please describe the nature of collaborations (local and international) with other research organisations and/or industry)

No collaboration

G. Assessment of Research Approach (Please highlight the main steps actually performed and indicate any major departure from the planned approach or any major difficulty encountered)

1. Purchase and commissioning of equipments
2. Collection of blood samples and extraction of DNA for 300 individuals in total – 100 individuals from each of the population groups –Maly, Chines and Indians
3. Polymerse chain reaction (PCR)amplification and genotyping of the DNA samples
4. Documentation
5. Statistical analysis

No departures from the planned approach and no difficulty encountered in achieving the objectives.

H. Assessment of the programme/Project Schedule (Please make any relevant comment regarding the actual duration of the programme/project and highlight any significant variation from plan)

The actual duration of the project was 36 months. There was no variation from the plan.

I. **Assessment of Programme/Project Costs** (Please comment on the appropriateness of the original budget and highlight any major departure from the planned programme/budget)

The budget allocated was RM 192,500. as per the plan the sample size included 300 individuals -100 from each population group- Malay, Chinese and Indians. However we have sampled and analyzed 606 samples – 185 Malays, 216 Chines and 195 Indians. Hence with in the budget, the materials purchased, were utilized for analysis of double the sample size and thereby creating a reliable database.

J. **Additional Programme/Project Funding Obtained** (In case of involvement of other funding sources, please indicate the source and total funding provided)

No other funds utilized

K **List and status of equipment purchased** (Status refers to the present condition of the equipment and its utilization)

Routinely used by Forensic science students in School of Health Sciences, USM

L. **Other Remarks** (Please include any other comment which you feel is relevant for the evaluation of this programme/project)

No other additional comments

M. Remarks by IRPA Institution Coordinator

The development of STR data base can be seen as a start of a Malaysian human identification system applicable to the Jabatan Kimia Malaysia and the PDRM in their effort to fight crime. Also the cases already settled for the Imigration Department could be seen as helping in establishing excellent services within the Civil Service. The overall objective of the research has been achieved and the impact to national development is good and will be felt in years to come.

N. Remarks by Program Leader

O. Remarks by Lead Institution Coordinator

P. Remarks by Monitoring Unit

Date:

M. Remarks by IRPA Institution Coordinator

N. Remarks by Program Leader

O. Remarks by Lead Institution Coordinator

P. Remarks by Monitoring Unit

Date:

BENEFITS REPORT

I. DESCRIPTION OF THE PROJECT

A. Programme / Project Identification: Human genome diversity

Programme / Project Number: 09-02-05-3122 EA011

Programme Title:

Project Title: STR DNA profiling on random ethnic malay,Chinese and Indian population of Peninsular Malaysia using flurorescent labelled multiplex primers kits for use in human identification.

Programme Leader:

Project Leader: S.Panneerchelvam

Tel: 609- 7656386 **Fax: 609 -7647884**

B. Type of research

Indicate the type of research of the project *(Please see definitions in the Guidelines for completing the Application Form)*

- ☐ Scientific research (fundamental research)
- ☑ Technology development (applied research)
- ☐ Product / process development (design and engineering)
- ☐ Social / policy research

C. Objectives of the project

1. Socio-economic objectives

Which socio-economic objectives are addressed by the project? *(Please identify the Sector, SEO Category and SEO Group under which the project falls. Refer to the Malaysian R&D Classification System brochure for the SEO Group code)*

Sector:	Advancement of knowledge
SEO Category:	Natural science, technologies and engineering
SEO Group and Code:	Biological sciences S50108

II. DIRECT OUTPUTS OF THE PROGRAMME / PROJECT

A. Technical contribution of the Programme/ Project

1. What was the achieved direct output of the Programme / project:

For scientific (fundamental) research projects?

- ☐ Algorithm
- ☐ Structure
- ☐ Data
- ☐ Others, please specify: _____

For technology development (applied research) projects:

- ☐ Method/technique
- ☐ Demonstrator/prototype
- ☑ Others, please specify: The STR data base compiled is routinely used in Jabatan Kima Malaysia (JKM) in Malaysia in human identification / paternity testing

For product/process development (design and engineering) Programme/ projects:

- ☐ Product/component
- ☐ Process
- ☐ Software
- ☐ Others, please specify: _____

For social / policy research :

- ☐ Policy
- ☐ Guidelines
- ☐ Others, please specify: _____

2. How would you characterize the quality of this output?

- ☐ Significant breakthrough
- ☑ Major improvement
- ☐ Minor improvement

B. Contribution of the project to knowledge

1. How has the output of the project been documented?

Detailed project report

Product / process specification documents

Others, please specify: One Master's research thesis on the data base for 15 STRs and publication of database in peer reviewed journal.

2. Did the project create an intellectual property stock?

Category Intellectual Property	Status		
Patent	Obtained	Pending	Filed
Copyright	Granted	Filed	
Trademark	Granted	Filed	
Industrial Design	Obtained	Register	
Others	Not applicable		

3. What are the publications available?

Article(s) in international scientific publications How many:5
Please Specify:

1. Mohd.Izuan Othman, Lay Hong Seah, **S.panneerchelvam** and Norazmi Mohd.Nor, Allele frequencies for the Powerplex 16 STR Loci in Javaneese population of Malaysia, J.Forensic Sci.(2004); 49 (1):190 –191.

2. **S.Panneerchelvam**,Kumara Thevan, LaiKoi Fai, M.SaravanaKumar, V.Sumathy, K.C.Yuvaneswari and M.N.Norazmi, Allele Frequency Distribution for 9 STR Loci in the Tamil Population of Malaysia(2004); 49 (4): 863 – 864.

3. **S.Panneerchelvam**,Kumara Thevan, LaiKoi Fai, M.SaravanaKumar, V.Sumathy, K.C.Yuvaneswari and M.N.Norazmi, Polymoprphism of 9 STRs in Ethnic Chinese Population of Malaysia (2004); 49 (5): 1132 -1133.

4Tan Chin Teck,Sam Choon kook, Nada Badruddin,**S.Panneerchelvam,** and M.N.Norazmi ,STR data for the Powerplex 16 STR loci for the Malays ,Chinese and Indian groups of the Malaysian population, J.Forensic Sci(2005); 50(5):1223 -1224.

5. Mohd.Izuan Othman, Lay Hong Seah, **S.Panneerchelvam** and Norazmi Mohd.Nor,
STR data for the Powerplex16 System locifor the Malays,Chinese and Indian groups of the Malaysian population, J.Forensic Sci(2005); 50(5)125 -1228.

Paper(s) national delivered at conferences/seminars How many:
Please Specify:
Paper(s) international delivered at conferences/seminars How many:
Please Specify:
Book How many:
Please Specify:

Others, please specify:

4. How significant are citations of the results?

Citations in national publications How many:
Citations in international publications How many:

Not yet

√ Not known -

III. ORGANISATIONAL OUTCOMES OF THE PROJECT

A. Contribution of the project to expertise development

1. How did the project contribute to expertise?

☐ PhD degrees

How many: _____
Please List Name: _____
Nationality: _____
Area Expertise : _____

☑ Masters degrees

How many: 1
Please List Name: En.Mohd.Izuan Othman
Nationality: _____
Area Expertise : _____

☐ Research staff with new specialty

How many: _____
Please List Name: _____
Nationality: _____
Area Expertise : _____

☐ Others, please specify:

2. How significant is this expertise?

☐ One of the key areas of priority for Malaysia

☑ An important area, but not a priority one

B. Economic contribution of the project?

1. What is the expected economic contribution of the project materialized?

☐ Sales of manufactured product / equipment

☐ Royalties from licensing

☐ Cost savings

☐ Time savings

☑ Others, please specify: Crime detection and identification of persons in immigration cases can be unequivocally be done

2. What is the expected level of the economic contribution?

☐ High economic contribution Value: RM _____

☐ Medium economic contribution Value: RM _____

☐ Low economic contribution Value: RM _____

3. When has this economic contribution materialized?

☐ Already materialized

☐ Within one year of project completion

☐ Within three years of project completion

☐ Expected in three years or more

☑ Not applicable

☐ Unsure of the time frame

C. Infrastructural contribution of the project

1. What infrastructural contribution has the project had?

☑ New equipment Value: RM 20,000 Please List:PCR Machine

☐ New / improved facility Investment: RM _____

☐ New networking

☐ Others, please specify: _____

2. How significant is this infrastructural contribution for the organisation?

☐ Not significant / does not leverage other projects

☑ Moderately significant

☐ Very significant / significantly leverages other projects

D. Contribution of the project to the organisation's reputation

1. How has the project contributed to increasing the reputation of the Organization

☑ Recognition as a Center of Excellence

☐ National award

☐ International award

☐ Demand for advisory services

☐ Invitations to give presentation in conferences

☐ Visits from other organisations

☑ Others, please specify: _____
The school of Health Sciences is recognized as a referral body for DNA fingerprinting Work. The school has conducted one national workshop for Police officers from various parts of Malaysia. The School of Health Sciences has conducted short term courses on DNA profiling techniques for Jabatan Kimia Malaysia and PDRM.

2. How important is the project's contribution to the organization's reputation?

☐ Not significant

☑ Moderately significant

☐ Very significant

IV. NATIONAL IMPACTS OF THE PROJECT

A. CONTRIBUTION OF THE PROJECT TO ORGANISATIONAL LINKAGES

1. Which kinds of linkages did the project create?

☐ Domestic industry linkages

☐ International industry linkages

☑ Linkages with domestic research institution, universities

☐ Linkages with international research institution, universities

2. What is the nature of linkages

☐ Staff exchanges

☑ Inter-organisational project team

☐ Research contract with a commercial client

☐ Informal consultation

☐ Others, please specify : _____

B. SOCIAL-ECONOMIC CONTRIBUTION OF THE PROJECT

1. Who are the direct customer/beneficiaries of the project output?

Please list
___Jabatan Kimia Malaysia and PDRM__in Malaysia_____
_____

2. How has/will the socio-economic contribution of the project materialized?

- ☐ Improvements in health
- ☐ Improvements in safety
- ☐ Improvements in the environment
- ☐ Improvements in energy consumption/supply
- ☐ Improvements in international relations
- ☐ √Others, please specify: Human identity in crime investigation and paternity testing incases of disputed kinship is a certainty; and it is routinely applied in immigration cases. _____

3. How important is this socio-economic contribution?

- ☐ High social contribution
- ☐ √ Medium social contribution
- ☐ Low social contribution

4. When has/will/this social contribution materialised?

- ☐ √ Already materialized
- ☐ Within one year of project completion
- ☐ Within three years of project completion
- ☐ Expected in three years or more
- ☐ Not applicable
- ☐ Unsure of the time frame

V. REMARKS

A. Remarks by IRPA Institution Coordinator

A well performed research project with definite contributions to the society at large.

B. Remarks by Program Leader

C. Remarks by Lead Institution Coordinator

D. Remarks by Monitoring Unit

Date: